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THE
[illegible]DON ENCYCLOPÆDIA.

PERCE[illegible] w[illegible]ich is so well understood that [illegible] the lexicographer to give any exp[illegible] has been called the first and most [illegible] the mind, by which it is conscious [illegible]s [illegible]eas. This definition, however, is imp[illegible]er, as [illegible] confounds perception with conscio[illegible] althou[illegible]h the objects of the former faculty ar[illegible] without us, those of the latter the energies [illegible] our own minds. Perception is that power or faculty, by which, through the medium of the senses, we have the cognizance of objects distinct and apart from ourselves, and learn that we are but a small part in the system of nature. By what process the senses give us this information is one of the most interesting enquiries in metaphysics. See METAPHYSICS.

PERCEVAL (Spencer), second son of John, second earl of Egmont, was born in 1762, and received his education at Harrow, and Trinity College, Cambridge, of which he became a member about the year 1775. On quitting the university he entered of Lincoln's Inn, with the view of following the profession of the law at the Chancery bar. In this pursuit he soon distinguished himself, and obtained a silk gown. In 1796 he represented Northampton in parliament, and, five years after, his legal abilities and family influence raised him to the office of solicitor-general. In 1802 he was made attorney-general, and filled that situation till 1807, when, on the death of Mr. Fox, he was appointed chancellor of the exchequer. In this high post he continued till the 11th of May, 1812, when, while approaching the door of the house of commons, a person named Bellingham discharged a pistol at him in the lobby, the bullet of which, entering his breast, deprived him almost instantly of life. The assassin avowed that he had been waiting with the view of destroying lord Leveson Gower, late ambassador to the court of St. Petersburgh, for some alleged negligence of his mercantile interests, and was brought to trial on the 15th. Although a plea of insanity was set up by his counsel, he was found guilty, and executed on the 18th of the same month.

PERCH, *n. s.*, *v. n.*, & *v. a.* Fr. *perche*, *percher*; Lat. *pertica*. A rod; measure; that on which birds sit and roost: to sit or roost; place on a perch.

He *percheth* on some branch thereby,
To weather him and his moist wings to dry.
Spenser.

The world is grown so bad,
That wrens make prey where eagles dare not *perch*.
Shakspeare.

The morning muses *perch* like birds and sing
Among his branches. *Crashaw.*

An evening dragon came,
Assailant on the *perched* roosts,
And nests in order ranged
Of some villatic fowl. *Milton's Agonistes.*

Glory, like the dazzling eagle, stood
Perched on my beaver in the Granic flood;
When fortune's self my standard trembling bore
And the pale fates stood frighted on the shore.
Lee.

For the narrow *perch* I cannot ride. *Dryden.*

They winged their flight aloft, then, stooping low,
Perched on the double tree, that bears the golden bough. *Id.*

Let owls keep close within the tree, and not *perch* upon the upper boughs. *South.*

PERCH, *n. s.* Fr. *perche*; Lat. *perca*. A fish.

The *perch* is one of the fishes of prey, that, like the pike and trout, carries his teeth in his mouth: he dare venture to kill and destroy several other kinds of fish: he has a hooked or hog-back, which is armed with stiff bristles, and all his skin armed with thick hard scales, and hath two fins on his back: he spawns but once a year, and is held very nutritive.
Walton's Angler.

PERCH, in ichthyology. See PERCA.

PERCHANCE, *adv.* Per and chance. Perhaps; peradventure.

How long within this wood intend you stay?
—*Perchance* till after Theseus' wedding day.
Shakspeare.

Finding him by nature little studious, she chose rather to endue him with ornaments of youth; as dancing and fencing, not without aim then *perchance* at a courtier's life. *Wotton.*

Only Smithfield ballad *perchance* to embalm the memory of the other. *L'Estrange.*

Stranger, I sent for thee, for that I deemed
Some wound was thine, that yon free band might chafe,—
Perchance thy worldly wealth sunk with yon wreck—
Such wound my gold can heal. *Maturin.*

PERCIVAL (Thomas), M. D., a physician, born at Warrington, Lancashire, in 1740, studied medicine at the universities of Edinburgh and Leyden, and returning to England, in 1765, settled at Manchester. He was the author of a variety of numerous able tracts on scientific subjects, especially Observations on the Deleterious Qualities of Lead; and Medical Ethics; A Father's Instructions to his Children; Moral and Literary Dissertations, &c.; and papers in the Transactions of the Manchester Philosophical Society, of which he was the founder and first president. He also attempted to establish public lectures on mathematics, the fine arts, and commerce, in that town; and sought to obtain support for dissenting academies at Warrington and Manchester, but was in both these last attempts unsuccessful. Dr. Percival died, highly respected both for talents and conduct, on the [illegible] of August, 1804. His works were publish[illegible] 1807, in 4 vols. 8vo. by his son.

PERCLOSE', *n. s.* Per and close. Conclusion; last part. Obsolete.

PER'COLATE, *v. a.* Lat. *percolo.* To stain through.

PERCUSS', *v. a.* } Lat. *percussio.* To
PERCUSS'ION, *n. s.* } strike: the act of strik-
PERCU'TIENT, *adj.* } ing; effect of sounds striking the ear: percutient being the corresponding adjective.

PERCUSSION, in mechanics, the impression a body makes in falling or striking upon another; or the shock of two bodies in motion.

PERCUSSION LOCKS; a late and useful invention. The percussion lock has no pan. In place of the pan, a small tube projects horizontally from the side of the gun. In this tube another small tube stands perpendicularly. The cock, instead of being formed to hold a flint, is shaped somewhat like a hammer, with a hollow to fit upon the tube last mentioned. On this tube a little cap of copper is placed, in the bottom of which is a chemical mixture that kindles by percussion. This percussion is produced by the cock, which therefore requires a very strong spring. The powder is made in various ways, and of different materials; among others, of mercury, purified nitric acid, and spirit of wine freed from water. The copper caps in which this chemical powder is placed are two and a half lines long, and two lines wide. Sometimes the powder is also formed in pills, and then a somewhat different contrivance is required to place the pills, covered with a little wax, to protect them from moisture, in the small tube. The advantages of a percussion lock are great: 1. Provided the spring of the cock is strong, and the chemical powder good, the gun cannot miss fire; while common locks are exposed to miss fire from many causes—bad flints, bad steel, bad priming, and weak springs. 2. The chemical powder explodes much more rapidly and forcibly than common powder, and therefore explodes the powder in the gun itself more forcibly, so as to produce a prompter and more effectual dischaige. 3. The moisture of the air has hardly any influence: in a violent rain, the lock is as sure to give fire as in the driest day. 4. The danger of an unintentional discharge is avoided: as long as the copper cap is not placed on the little tube, the gun cannot go off, even if the cock is snapped by mistake; while, with other guns, there is always danger, even when no priming has been put in the pan, because some grains may always escape through the touchhole, and the cock may always be accidentally snapped. The caps or pills are not dangerous, because it requires a strong percussion to explode the powder.

PERCY (Thomas), a learned prelate, related to the family of Northumberland, was born at Bridgenorth in Shropshire in 1728, and educated at Christ Church, Oxford, where he took his master's degree in 1753, and on entering into orders, was presented to the vicarage of Easton Mauduit in Northamptonshire, which he held with the rectory of Wilby. In 1769 he was made chaplain to the king, in 1778 promoted to the deanery of Carlisle, and in 1782 advanced to the bishopric of Dromore in Ireland, where he died in 1811. His works are, 1. Han Ki Chouan, a translation from the Chinese. 2. Chinese Miscellanies. 3. Five Pieces of Runic Poetry, translated from the Icelandic Language. 4. A new Translation of the Song of Solomon. 5. Reliques of Ancient English Poetry, 3 vols. 6. A Key to the New Testament. 7. The Northumberland Household Book. 8. The Hermit of Warkworth, a poem, in the ballad style. 9. A Translation of Mallet's Northern Antiquities.

PERCY ISLES, a chain of islands in the South Pacific, near the north-east coast of New Holland. They extend from about lat. 21° 32' to 21° 45' S., and are distant about thirty miles from the main land. They were visited by Flinders in 1802, who laid down their bearings and gave them this name of Percy Islands. The largest is about thirteen miles in circuit, and 1000 feet high. They are only occasionally visited by the Indians from the main land for turtle. The large vampyre bat was frequently found hanging by the claws, with its head downwards, under the palm trees.

PERDICCAS I., II., and III., kings of Macedonia. See MACEDON.

PERDICIUM, in botany, a genus of the polygamia superflua order, belonging to the syngenesia class of plants; and in the natural method ranking under the forty-ninth order, compositæ. The receptacle is naked; the pappus is simple; the florets bilabiate.

PERDITION, *n. s.* Fr. *perdition;* Lat. *perditio.* Destruction; death: ruin; eternal death.

> Upon tidings now arrived, importing the meer *perdition* of the Turkish fleet, every man puts himself in triumph. *Shakspeare.*

> Quick let us part! *Perdition's* in thy presence,
> And horror dwells about thee! *Addison's Cato.*

PERDIX, in ornithology, a genus of birds, belonging to the order of gallinæ, ranked by Linnæus along with the genus tetrao, or grous; but now very properly disjoined by Dr. Latham, and classed as a distinct genus, of which he describes the following characters:—The bill is convex, strong, and short; the nostrils are covered above with a callous prominent rim: the orbits are papillose; the feet naked; and most of the genus are furnished with spurs. There are forty-eight species, of which the two principal are the partridge and quail.

1. P. communis, the common partridge, is so well known, that a description of it is unnecessary, and we have not room to describe the foreign species. We refer those who wish complete information to Dr. Latham's valuable System of Ornithology. Partridges are found in every country and in every climate; as well in the frozen regions about the pole, as the torrid tracts under the equator. In Greenland, the partridge, which is brown in summer, as soon as the icy winter sets in, is clothed with a warm down beneath; and its outward plumage assumes the color of the snow among which it seeks its food. Those of Barakonda, on the other hand, are longer legged, much swifter of foot, and choose the highest rocks and precipices to reside in. They all, however, agree in one character, of being immoderately addicted to venery.

[illegible] coturnix [illegible] il, is not above [illegible]lf th[illegible] The feathers of [illegible]e [illegible] rusty brown; [illegible]e breast is [illegible]ish red, spotted [illegible]ith black; the [illegible] back are marked [illegible]ith lines of [illegible] yellow, and the legs are of [illegible] pale hue. [illegible] colors thus described, and the size, [illegible] resembles a partridge [illegible]n shape, and [illegible] it is a bird of passage, [illegible] is like all [illegible] poultry kind in its [illegible]abits and [illegible] seems to be an [illegible]nhabitant o[illegible]t is observed to shift quarter[illegible] season, coming north in spri[illegible] depa[illegible] autumn, and in vast flocks. [illegible] west coast of Naples, within four or five [illegible]0,000 have been taken in a day. In En[illegible] are not numerous at any time. They [illegible] the partridge, and make no nest, except a few [illegible] leaves or stalks scraped together; and sometimes a hollow on the bare ground suffi[illegible] female lays six or seven eggs, of [illegible], marked with irregular rust-colo[illegible] young follow the [illegible]other as soon [illegible], like young partridges. [illegible]hey have but [illegible] in a year. Quail-[illegible]ghting was a favorite amusement among the [illegible]thenians. They abstained from the flesh of [illegible]s bird, deeming it unwholesome, as supposing [illegible]at it fed upon the white hellebore: but they [illegible]ared great numbers of them for the pleasure of [illegible]eing them fight, and staked sums of money, as [illegible]e do with regard to cocks, upon the success of [illegible]he combat. With us its flesh is considered as [illegible] very great delicacy. Quails are easily caught by a call.

PERDUE', *adv.* From the French *perdue* or forlorn hope: as *perdue* or advanced sentinel. Close; in ambush.

> Few minutes he had lain *perdue*,
> To guard his desp'rate avenue. *Hudibras.*

PERDUE BAY, a bay on the south-west coast of St. Vincent; a mile north-west of Kingston Bay.

PER'DULOUS, *adj.* Lat. *perdo.* Lost; thrown away.

There may be some wandering *perdulous* wishes of known impossibilities; as a man who hath committed an offence, may wish he had not committed it; but to chuse efficaciously and impossibly is as impossible as an impossibility. *Bramhall.*

PERDURABLE, *adj.* Fr. *perdurable*; Lat. *perduro.* Lasting; long continued. A word not in use.

Confess me knit to thy deserving with cables of [illegible]*erdurable* toughness. *Shakspeare. Othello.*

O *perdurable* shame! let's stab ourselves. *Shakspeare.*

> Why should he, for the momentary trick,
> Be *perdurably* fined. *Id. Measure for Measure.*
> The vig'rous sweat
> [illegible]oth lend the lively springs their *perdurable* heat. *Drayton.*

PERECOP, an ancient fortress in the south [illegible]f the isthmus which joins the peninsula of the [illegible]rimea to the continent. It is the ancient Taphræ. In the neighbourhood are lakes, on the [illegible]urface of which a great quantity of salt crystallises naturally, in May, June, and July. This [illegible]lt is collected and sold to the average amount [illegible] 20,000 waggon loads yearly.

PER'EGAL, *adj.* Fr. *peregal.* Equal. Obsolete.

> Whilom thou wast *peregal* to the best,
> And wont to make the jolly shepherds glad;
> With piping and dancing did pass the rest. *Spenser.*

PEREGRINATION, *n. s.* } Old Fr. *pere-*
PE'REGRINE, *adj.* } *grin*; Lat. *peregrinus.* Travel; abode abroad: peregrine, foreign; not native; not domestic.

The received opinion, that putrefaction is caused by cold or *peregrine* and preternatural heat, is but nugation. *Bacon.*

It was agreed between them, what account he should give of his *peregrination* abroad. *Id.*

It is not amiss to observe the heads of doctrine, which the apostles agreed to publish in all their *peregrinations.* *Hammond.*

That we do not contend to have the earth pass for a paradise, we reckon it only as the land of our *peregrination*, and aspire after a better country. *Bentley.*

PEREMPT', *v. a.* } Lat. *peremptus.* To
PEREMP'TION, *n. s.* } kill; to crush. A law term.

Nor is it any objection, that the cause of appeal is *perempted* by the desertion of an appeal; because the office of the judge continues after such instance is *perempted.* *Ayliffe.*

This *peremption* of instance was introduced in favour of the public, lest suits should be rendered perpetual. *Id.*

PEREMPTORY, *adj.* } Fr. *peremptoire*;
PER'EMPTORILY, *adv.* } barb. Lat. *peremp-*
PER'EMPTORINESS, *n. s.* } *torius*, from *peremptus*, killed. Dogmatical; absolute; such as destroys expostulation: the adverb and noun-substantive corresponding.

He may have fifty-six exceptions *peremptorily* against the jurors, of which he shall show no cause. *Spenser.*

As touching the apostle, wherein he was so resolute and *peremptory*, our Lord Jesus Christ made manifest unto him, even by intuitive revelation, wherein there was no possibility of error. *Hooker.*

> Not death himself
> In mortal fury is half so *peremptory*,
> As we to keep this city. *Shakspeare. King John.*

Not to speak *peremptorily* or conclusively, touching the point of possibility, till they have heard me deduce the means of the execution. *Bacon.*

> If I entertaine
> As *peremptorie* a desire, to levell with the plaine
> A citie, where they loved to live; stand not betwixt
> my ire
> And what it aims at. *Chapman.*

Norfolk denies them *peremptorily.* *Daniel.*

In all conferences it was insisted *peremptorily*, that the king must yield to what power was required. *Clarendon.*

Self-conceit and *peremptoriness* in a man's own opinions are not commonly reputed vices. *Tillotson.*

God's laws *peremptorily* injoin us, and the things therein implied do straitly oblige us to partake of the holy sacrament. *Kettlewell.*

Though the text and the doctrine run *peremptory* and absolute, whosoever denies Christ shall assuredly be denied by him; yet still there is a tacit condition, unless repentance intervene. *South.*

He would never talk in such a *peremptory* and discouraging manner, were he not assured that he was able to subdue the most powerful opposition against the doctrine which he taught. *Addison.*

Peremptoriness is of two sorts; the one a magisterialness in matters of opinion; the other a positiveness in relating matters of fact.
Government of the Tongue.

The more modest confess, that learning was to give us a fuller discovery of our ignorance, and to keep us from being *peremptory* and dogmatical in our determinations. *Collier.*

Some talk of letters before the deluge; but that is a matter of mere conjecture, and nothing can be *peremptorily* determined either the one way or the other. *Woodward.*

Never judge *peremptorily* on first appearances.
Clarissa.

PEREN'NIAL, *adj.* } Lat. *perennis.* Last-
PEREN'NITY, *n. s.* } ing through the year: quality of lasting through all seasons.

The matter wherewith these *perennial* clouds are raised, is the sea that surrounds them. *Harvey.*

If the quantity were precisely the same in these *perennial* fountains the difficulty would be greater.
Cheyne.

That springs have their origin from the sea, and not from rains and vapours, I conclude from the *perennity* of divers springs.
Derham's Physico-Theology.

PERENNIALS, or PERENNIAL FLOWERS, in botany, a term applied to those plants whose roots will abide many years, whether they retain their leaves in winter or not. Those which retain their leaves are called evergreens; but such as cast their leaves are named deciduous, or perdifols.

PER'FECT, *adj.* & *v. a.*
PER'FECTER, *n. s.*
PERFEC'TION,
PERFEC'TIONATE, *v. a.*
PERFEC'TIVE, *adj.*
PERFEC'TIVELY, *adv.*
PER'FECTNESS, *n. s.*
} Fr. *parfait;* Latin, *perfectus.* Complete; full; consummate; certain; due; not defective or redundant; blameless; pure: to perfect is to finish; make complete; conclude; make skilful, or fully to instruct: a perfecter is he who makes perfect: perfection and perfectness mean completeness; goodness; virtue; supreme excellence: to perfectionate, a word only used by Dryden for to advance to perfection: perfective is having the tendency to make perfect: perfectively, in such manner as brings to perfection.

If *perfeccioun* was bi the preesthood of leuy, for undir hym the peple took the lawe, what ghit was it nedeful another preest to rise bi the ordre of Melchisedech? *Wiclif. Ebrewis* vii.

Put on charity, which is the bond of *perfectness.*
Col. iii. 14.

Thou shalt be *perfect* with the Lord thy God.
Deut. xviii.

If we love one another, God dwelleth in us, and his love is *perfected* in us. 1 *John* iv. 12.

What tongue can her *perfections* tell,
In whose each part all pens may dwell? *Sidney.*

We count those things *perfect* which want nothing requisite for the end whereto they were instituted.
Hooker.

Man doth seek a triple *perfection*; first, a sensual, consisting in those things which very life itself requireth, either as necessary supplements or as ornaments thereof; then an intellectual, consisting in those things which none underneath man is capable of; lastly, a spiritual and divine, consisting in those things whereunto we tend by supernatural means here, but cannot here attain. *Id.*

Within a ken our army lies;
Our men more *perfect* in the use of arms,
Our armour all as strong, our cause the best;
Then reason wills our hearts will be as good.
Shakspeare.

Is this your *perfectness?* *Id.*

My parts, my title, and my *perfect* soul
Shall manifest me rightly. *Id. Othello.*

It is a judgment maimed and most imperfect,
That will confess *perfection* so could err
Against all rules of nature. *Id.*

Thou art *perfect* then, our ship hath touched upon
The deserts of Bohemia. *Shakspeare. Winter's Tale.*

Her cause and yours
I'll *perfect* him withal, and he shall bring you
Before the duke. *Id. Measure for Measure.*

I do not take myself to be so *perfect* in the privileges of Bohemia as to handle that part; and will not offer at that I cannot master. *Bacon.*

There is no variety in that which is *perfect,* because there is but one *perfection;* and so much shall we grow nearer to *perfectness,* by how much we draw nearer to unity and uniformity. *Bp. Hall.*

And they, so *perfect* in their misery,
Not once perceive their foul disfigurement.
Milton's Comus.

Uriel, no wonder if thy *perfect* sight
See far and wide. *Milton.*

True virtue being united to the heavenly grace of faith makes up the highest *perfection.* *Id.*

Beauty now must *perfect* my renown;
With that I governed him that rules this isle.
Waller.

Praise and adoration are actions *perfective* of our souls. *More.*

Chawing little sponges dipt in oil, when *perfectly* under water, he could longer support the want of respiration. *Boyle.*

No human understanding being absolutely secured from mistake by the *perfection* of its own nature, it follows that no man can be infallible but by supernatural assistance. *Tillotson.*

An heroick poem requires, as its last *perfection,* the accomplishment of some extraordinary undertaking, which requires more of the active virtue than the suffering. *Dryden.*

Painters and sculptors, chusing the most elegant natural beauties, *perfectionate* the idea, and advance their art above nature itself in her individual production; the utmost mastery of human performance.
Id.

He has founded an academy for the progress and *perfectionating* of painting. *Id.*

Endeavour not to settle too many habits at once, lest by variety you confound them, and so *perfect* none. *Locke.*

We know bodies and their properties most *perfectly.*
Id.

Eternal life shall not consist in endless love; the other faculties shall be employed in actions suitable to, and *perfective* of their nature.
Ray on the Creation.

What toil did honest Curio take
To get one medal wanting yet,
And *perfect* all his Roman set? *Prior.*

As virtue is seated fundamentally in the intellect, so *perfectively* in the fancy; so that virtue is the force of reason in the conduct of our actions and passions to a good end. *Grew.*

Too few, or of an improper figure and dimension, to do their duty in *perfection.* *Blackmore.*

If God be infinitely holy, just, and good, he must take delight in those creatures that resemble him most in these *perfections.* *Atterbury.*

Whoever thinks a *perfect* work to see,
Thinks what ne'er was, nor is, nor e'er shall be.
Pope.

This practice was altered; they offered not to Mercury, but to Jupiter the *perfecter*. *Broome.*

The question is, not whether gospel *perfection* can be fully attained, but whether you come as near it as a sincere intention and careful diligence can carry you. *Law.*

PERFECTIBILITY, a word which we owe to the new philosophy, which made so great a noise in the first stages of the French revolution. As far as we understand, the word perfectibility is pretended, in the writings of that disastrous period, to mean the ultimate and absolute perfection to which man and society have a natural and necessary tendency; and which, we were told, neither the tyranny of kings nor the bigotry of priests could eventually restrain.

PERFECTION is divided, according to some writers, into physical, moral, and metaphysical.

1. PERFECTION, METAPHYSICAL, TRANSCENDENTAL, or ESSENTIAL, is the possession of all the essential attributes, or of all the parts necessary to the integrity of a substance: or it is that whereby a thing has or is provided of every thing belonging to its nature. This is either absolute, where all imperfection is excluded, such as the perfection of God; or secundum quid, and in its kind.

2. PERFECTION, MORAL, is an eminent degree of virtue or moral goodness, to which men arrive by repeated acts of piety, beneficence, &c. This is usually subdivided into absolute or inherent, which is actually in him to whom we attribute it; and imputative, which exists in some other, and not in him it is attributed to.

3. PERFECTION, PHYSICAL, or NATURAL, is that whereby a thing has all its powers and faculties, and those too in full vigor; and all its parts both principal and secondary, and those in their due proportion, constitution, &c., in which sense man is said to be perfect when he has a sound mind in a sound body. This perfection is by the schools frequently termed ενεργητικη, because a thing is enabled thereby to perform all its operations.

PER'FIDY, *n. s.*
PERFID'IOUS, *adj.*
PERFID'IOUSLY, *adv.*
PERFID'IOUSNESS, *n. s.*
Fr. *perfidie;* Lat. *perfidia.* Treachery; want of faith; breach of faith: perfidious is treacherous; false to trust.

Perfidiously
He has betrayed your business, and given up,
For certain drops of salt, your city Rome.
Shakspeare.

O Judas, how happy had it been for thee, if thou hadst never done what thou *perfidiously* intendedst! *Bp. Hall.*

O spirit accursed,
Forsaken of all good, I see thy fall
Determined, and thy hapless crew involved
In this *perfidious* fraud. *Milton.*

Tell me, *perfidious*, was it fit,
To make my cream a perquisite,
And steal to mend your wages?
Widow and Cat.

They eat *perfidiously* their words,
And swear their ears through two inch boards.
Hudibras.

Some things have a natural deformity in them; as perjury, *perfidiousness*, and ingratitude.
Tillotson.

Can he not deliver us possession of such places as would put him in a worse condition, whenever he should *perfidiously* renew the war?
Swift's Miscellany.

PER'FLATE, *v. a.* Lat. *perflo.* To blow through.

If eastern winds did *perflate* our climates more frequently, they would clarify and refresh our air.
Harvey.

Miners, by *perflations* with large bellows, give motion to the air, which ventilates and cools the mines.
Woodward.

The first consideration in building of cities is to make them open, airy, and well *perflated*.
Arbuthnot on Air.

PER'FORATE, *v. a.*
PERFORA'TION, *n. s.*
Lat. *perforo.* To pierce with a tool; bore; act of boring or piercing.

Draw the bough of a low fruit tree newly budded without twisting, into an earthen pot *perforate* at the bottom, and then cover the pot with earth; it will yield a very large fruit.
Bacon's Natural History.

The likeliest way is the *perforation* of the body of the tree in several places one above another, and the filling of the holes. *Bacon.*

The industrious *perforation* of the tendons of the second joints of fingers and toes, and the drawing the tendons of the third joints through them.
More's Divine Dialogues.

A *perforated* bladder does not swell. *Boyle.*

That the nipples should be made spongy, and with such *perforations* as to admit passage to the milk, are arguments of providence.
Ray on the Creation.

The aperture was limited by an opaque circle placed between the eye-glass and the eye, and *perforated* in the middle with a little round hole for the rays to pass through to the eye. *Newton.*

The laboured chyle pervades the pores,
In all the arterial *perforated* shores. *Blackmore.*

Worms *perforate* the guts. *Arbuthnot.*

The patient, placed in a convenient chair, dipping the trocar in oil, stab it suddenly through the teguments, and, withdrawing the *perforator*, leave the waters to empty by the canula. *Sharp.*

And such in ancient halls and mansions drear
May still be seen; but *perforated* sore,
And drilled in holes, the solid oak is found,
By worms voracious eaten through and through.
Cowper.

PERFORCE', *adv.* Per and force. By violence; violently.

Guyon to him leaping, staid
His hand, that trembled as one terrified;
And though himself were at the sight dismayed,
Yet him *perforce* restrained. *Spenser.*

Jealous Oberon would have the child,
But she *perforce* withholds the loved boy.
Shakspeare.

She amaz'd, her cheeks
All trembling and arising, full of spots,
And pale with death at hand, *perforce* she breaks
Into the inmost rooms. *Peacham on Poetry.*

PERFORM', *v. a.* & *v. n.*
PERFOR'MABLE, *adj.*
PERFOR'MANCE,
PERFOR'MER, *n. s.*
Ital. *performare*, of Lat. *per* and *formo.* To execute; do; achieve; accomplish; discharge: to succeed: performable is practicable: performance, accom-

plishment of a design or promise; completion; composition; work; action: performer, he who performs; particularly, he who publickly displays his skill or ability.

I will cry unto God who *performeth* all things for me. *Psalms.*

Perform the doing of it; that as there was a readiness to will, so there may be a *performance.* 2 *Cor.* viii. 11.

Let all things be *performed* after the law of God diligently. 1 *Esdras* viii. 21.

All three set among the foremost ranks of fame for great minds to attempt, and great force to *perform* what they did attempt. *Sidney.*

Hast thou, spirit,
Performed to point the tempest that I bad thee? *Shakspeare.*

Promising is the very air o' th' time; it opens the eyes of expectation: *performance* is ever the duller for his act, and, but in the plainer kind of people, the deed is quite out of use. *Id.*

In this slumbery agitation, besides her walking and other actual *performances*, what have you heard her say? *Id.*

The merit of service is seldom attributed to the true and exact *performer.* *Id.*

Men forget the relations of history, affirming that elephants have no joints, whereas their actions are not *performable* without them. *Browne.*

Thou, my love,
Perform his funerals with paternal care. *Dryden.*

In the good poems of other men, I can only be sure, that 'tis the hand of a good master; but in your *performances* 'tis scarcely possible for to be deceived. *Id.*

The only means to make him successful in the *performance* of these great works was to be above contempt. *South.*

He effectually *performed* his part, with great integrity, learning, and acuteness; with the exactness of a scholar, and the judgment of a complete divine. *Waterland.*

When a poet has *performed* admirably in several illustrious places, we sometimes also admire his very errors. *Watts.*

Men may, and must differ in their employments; but yet they must all act for the same ends, as dutiful servants of God, in the right and pious *performance* of their several callings. *Law.*

Few of our comick *performances* give good examples. *Clarissa.*

PERFUME', *n. s.* & *v. a.* } French *parfume.*
PERFU'MER, } Strong odor of sweetness; pleasant scent: to give or impregnate with such scent: a perfumer is a dealer in perfumes.

Why rather, sleep, liest thou in smoky cribs,
And husht with buzzing night-flies to thy slumber,
Than in the *perfumed* chambers of the great,
Under the canopies of costly state,
And lulled with sounds of sweetest melody? *Shakspeare.*

Pomanders and knots of powders for drying rheums are not so strong as *perfumes*; you may have them continually in your hand, whereas *perfumes* you can take but at times. *Bacon.*

Smells adhere to hard bodies; as in *perfuming* of gloves, which showeth them corporeal. *Id.*

A moss the *perfumers* have out of apple trees, that hath an excellent scent. *Id. Natural History.*

Perfumes, though gross bodies that may be sensibly wasted, yet fill the air, so that we can put our nose in no part of the room where a perfume is burned but we smell it. *Digby.*

Even the rough rocks with tender myrtle bloom,
And trodden weeds send out a rich *perfume.* *Addison.*

Pinks and roses bloom,
And every bramble sheds *perfume.* *Gay.*

The pains she takes are vainly meant
To hide her amorous heart,
'Tis like *perfuming* an ill scent,
The smell's too strong for art. *Granville.*

No rich *perfumes* refresh the fruitful field,
Nor fragrant herbs their native incense yield. *Pope.*

See spicy clouds from lowly Sharon rise,
And Carmel's flowery top *perfumes* the skies. *Id.*

First issued from *perfumers* shops
A crowd of fashionable fops. *Swift.*

PERFUME, denotes either the volatile effluvia from any body affecting the organ of smelling, or the substance emitting those effluvia; in which last sense the word is most commonly used. The generality of perfumes are made up of musk, ambergris, civet, rose and cedar woods, orange flowers, jessamines, jonquils, tuberoses, and other odoriferous flowers. Those drugs commonly called aromatics, such as storax, frankincense, benzoin, cloves, mace, &c., enter the composition of a perfume; some are also composed of aromatic herbs, or leaves, as lavender, marjoram, sage, thyme, hyssop, &c. The use of perfumes was frequent among the Hebrews, and among the orientals in general, before it was known to the Greeks and Romans. They came to be very common among the Greeks and Romans, especially those composed of musk, ambergris, and civet. The nardus and malobathrum were held in much estimation, and were imported from Syria. The unguentum nardinum was variously prepared, and contained many ingredients. Malobathrum was an Indian plant. Perfumes were also used at sacrifices to regale the gods; at feasts, to increase the pleasures of sensation; at funerals, to overpower cadaverous smells, and please the manes of the dead; and in the theatres, to prevent the offensive effluvia proceeding from a crowd from being perceived.

PERFUNCTORILY, *adv.* Lat. *perfunctoriè.* Carelessly; negligently; so as merely to satisfy external form.

His majesty casting his eye *perfunctorily* upon it, and believing it had been drawn by mature advice, no sooner received it, than he delivered it to the lord-keeper. *Clarendon.*

Lay seriously to heart the clearness and evidence of these proofs, and not *perfunctorily* pass over all the passages of the gospel, which are written on purpose that we may believe, without weighing them. *Lucas.*

A transient and *perfunctory* examination of things leads men into considerable mistakes, which a more correct and rigorous scrutiny would have detected. *Woodward.*

Whereas all logic is reducible to the four principal operations of the mind, the two first of these have been handled by Aristotle very *perfunctorily*; of the fourth he has said nothing at all. *Baker.*

PERFUSE', *v. a.* Lat. *perfusus.* To tincture; overspread. Not used.

These dregs immediately *perfuse* the blood with melancholy, and cause obstructions. *Harvey.*

PERGAMA, the citadel of Troy; which, because of its extraordinary height, gave name to all high buildings (Servius, Virg.) Others say the walls of Troy were called Pergama.

PERGAMEA, PERGAMIA, names given by Virgil and Plutarch to Pergamum.

PERGAMO, or PERGAMOS, the modern name of Pergamum, and Pergamus.

PERGAMUM, PERGAMEA, or PERGAMIA, a town of Crete, built by Agamemnon in memory of his victory (Plut. Virg. Velleius). Here was the burying-place of Lycurgus (Aristoxenus). It was situated near Cydonia (Servius); but Scylax helps him out, who places the Dactynnean temple of Diana, which stood near Cydonia (Strabo), to the north of the territory of Pergamia.

PERGAMUM, a town of Mysia, situated on the Caicus, which runs by it (Plin. Strabo). It was the royal residence of Eumenes, and of the kings of the race of the Attali (Livy). It had an ancient temple of Æsculapius (Tacitus). The ornament of Pergamum was the royal library, vying with that of Alexandria in Egypt; the kings of Pergamum and Egypt rivalling each other in this respect (Pliny). Strabo ascribes this rivalry to Eumenes. Plutarch mentions 200,000 volumes in the library at Pergamum. Here the membranæ Pergamenæ, whence the name parchment, were invented for the use of books (Varro, Pliny). It was the country of Galen, and of Oribasius, physician to Julian (Eunapius). Here P. Scipio died (Cicero). Attalus, son of Eumenes, dying without issue, bequeathed his kingdom to the Roman people, who reduced it to a province (Strabo). Here was one of the nine conventus juridici, or assemblies of the Asia Romana, called Pergamenus, and the ninth in order, which Pliny also calls jurisdictio Pergamena.

PERGAMUS, an ancient kingdom of Asia, formed out of the ruins of the empire of Alexander the Great. It commenced about the year 283. The first sovereign was one Philetærus a eunuch, by birth a Paphlagonian, of a mean descent, and in his youth a menial servant to Antigonus, one of Alexander's captains. Philetærus left the city of Pergamus to his brother, or, according to some, to his brother's son Eumenes I., who obtained possession of the greater part of the province of Asia. Eumenes was succeeded by Attalus I., nephew of Philetærus, who, during a reign of forty-three years, was engaged in many successful wars with the Gauls, Philip of Macedon, and others. He was a man of great generosity, and such an enthusiast in favor of genius that he caused a grammarian named Daphidas to be thrown into the sea from the top of a high rock, because he spoke disrespectfully of Homer. Attalus was succeeded by his eldest son Eumenes II. He was exceedingly attached to the Romans, and assisted them in conquering Antiochus the Great, for which they rewarded him by adding to his dominions all the countries on this side of Mount Taurus, which belonged to that monarch. He continued long a faithful ally of that powerful people, but, having entered into a secret treaty with Perseus king of Macedon, he excited their resentment; and, although he sought to deprecate their vengeance, it would have fallen on him, but for his death, which happened in the thirty-ninth year of his reign. He left one son, but, as he was an infant, he nominated his brother to succeed him. Attalus II., in the beginning of his reign, was routed in a pitched battle by Prussias king of Bithynia; but the intervention of the Romans procured him complete redress. The latter part of his life he devoted to ease and luxury. He died in his eighty-second year, about 138 B. C. He was succeeded by Attalus III. the son of Eumenes, whose reign was one continued horrid scene of madness and tyranny. On his death a will was found, by which he left the Roman people heirs of all his goods; upon which they seized on the kingdom, and reduced it to a province of their empire by the name of Asia Proper. Aristonicus, a son of Eumenes by an Ephesian courtesan, endeavoured to wrest it from them, but although he gained several battles he could not attain his object, but died in prison. The country remained subject to the Romans while their empire lasted, but is now in the hands of the Turks. The city is half ruined, and is still known by the name of Pergamo.

PERGUNNAH, in the language of Hindostan, means the largest subdivision of a province, whereof the revenues are brought to one particular head cutchery, whence the accounts and cash are transmitted to the general cutchery of the province.

PERHAPS', *adv.* Per and hap. Peradventure; it may be; mayhap.

> *Perhaps* the good old man that kissed his son,
> And left a blessing on his head,
> His arms about him spread,
> Hopes yet to see him ere his glass be run.
> *Flatman.*

> Somewhat excellent may be invented, *perhaps* more excellent than the first design, though Virgil must be still excepted, when that *perhaps* takes place.
> *Dryden.*

> His thoughts inspired his tongue,
> And all his soul received a real love;
> *Perhaps* new graces darted from her eyes,
> *Perhaps* soft pity charmed his yielding soul,
> *Perhaps* her love, *perhaps* her kingdom charmed him.
> *Smith.*

> It is not his intent to live in such ways as, for ought we know, God may *perhaps* pardon, but to be diligent in such ways, as we know that God will infallibly reward. *Law.*

> A dejection of mind, which *perhaps* may be removed by to-morrow, rather disqualifies me for writing.
> *Cowper's Private Correspondence.*

PERIAGOGUE, in rhetoric, is used where many things are accumulated into one period which might have been divided into several.

PERIAGUA, a sort of large canoe made use of in the Leeward Islands, South America, and the Gulf of Mexico. It is composed of the trunks of two trees hollowed and united together; and thus differs from the canoe, which is formed of one tree.

PERIANDER, tyrant of Corinth and Corcyra, was reckoned among the seven wise men of Greece; though he might rather have been reckoned among the most wicked men, since he changed the government of his country, deprived

his countrymen of their liberty, usurped the sovereignty, and committed the most shocking crimes. He committed incest with his mother, and kicked to death his wife Melissa. Yet he passed for one of the greatest politicians of his time; and Heraclides tells us that he forbad voluptuousness; that he imposed no taxes; caused all pimps to be drowned; and established a senate. He died A. A. C. 585.

PERIANTHIUM, from περι, round, and ανθος, the flower, the flower cup properly so called, the most common species of calyx, placed immediately under the flower, which is contained in it as in a cup.

PERIAPATAM, PRIYA PATANA, OR THE CHOSEN CITY, a town and domain in the Rajah's territories, Mysore, towards the borders of the Coorg country, thirty-one miles west by south from Seringapatam. This domain formerly belonged to a polygar family, named Nandirax. About 160 years ago the chief was attacked by Chica Deva Raya, the Curtur of the Mysore; and, finding himself unable to resist so powerful an enemy, he killed his wives and children, and then rushed into the midst of his enemies, where he died also. On the approach of general Abercrombie's army, in 1790, Tippoo ordered both the town and fort to be destroyed. The fortifications are now a mere ruin. The surrounding country is beautiful, but at the time it was conquered by the British did not contain one-fourth the number of inhabitants necessary for its cultivation. The natives declare they have never seen ice or snow on the top even of the highest hills. There is at Bettadapoor a hill about 4000 feet above the level of the sea. Periapatam, in time of Peace, is an entrepot of trade between the Coorg and Mysore sovereignties. Sandal wood grows in the skirts of the forests. In twelve years it attains, in a strong soil, the most suitable size for being cut. The Periapatam district produces about 2000 cwt., and the whole sandal wood of India is now in the possession of the East India Company and the rajah of Mysore. The woods are much infested, and the crops injured, by wild elephants, which are more numerous on the borders of the Coorg country than either at Chittagong or in Pegu. Among the trees is abundance also of teak.

To prepare the sandal wood, the billets are here buried in dry ground for two months, during which time the white ants eat up all the outer wood without touching the heart, which is the sandal. The deeper the color the higher the perfume, but the root sandal is the best. The large billets are sent to China, and the middle sized used. The chops, fragments, and smaller assortments, are best for the Arabian market, and from them the sandal oil is distilled.

PER'IAPT, *n. s.* Gr. περιαπτω. Amulet; charm worn as a preservative against disease or mischief.

The Regent conquers, and the Frenchmen fly:
Now help, ye charming spells and *periapts*.
Shakspeare.

PERICAR'DIUM, *n. s.* Fr. *pericarde;* Gr. περι and καρδια, the heart. The membrane that contains the heart.

The *pericardium* is a thin membrane of a conic figure, that resembles a purse, and contains the heart in its cavity: its basis is pierced in five places, for the passage of the vessels which enter and come out of the heart: the use of the *pericardium* is to contain a small quantity of clear water, which is separated by small glands in it, that the surface of the heart may not grow dry by its continual motion. *Quincy.*

PERICAR'PIUM, *n. s.* Fr. *pericarpe;* Gr. περι and καρπος, fruit. In botany, a pellicle or thin membrane encompassing the fruit or grain of a plant, or that part of a fruit that envelopes the seed.

Besides this use of the pulp or *pericarpium* for the guard of the seed, it serves also for the sustenance of animals. *Ray.*

PERICHORUS, in antiquity, a name given by the Greeks to those games or combats that were not consecrated to any of the gods.

PERICLES was one of the greatest men that ever flourished in Greece. He was very brave; and so eloquent that he gained almost as great an authority under the republican government of Athens as if he had been a monarch. His fondness for women was one of his chief vices. He married the celebrated Aspasia, and died the third year of the Peloponnesian war. See ATTICA.

PERICRA'NIUM, *n. s.* Fr. *pericrane;* from περι and *cranium*, the skull.

The *pericranium* is the membrane that covers the skull: it is a very thin and nervous membrane of an exquisite sense, such as covers immediately not only the cranium, but all the bones of the body; except the teeth; for which reason it is also called the periosteum. *Quincy.*

Having divided the *pericranium*, I saw a fissure running the whole length of the wound. *Wiseman.*

PERIC'ULOUS, *adj.* Lat. *periculosus.* Dangerous; hazardous. A word not in use.

As the moon every seventh day arriveth unto a contrary sign, so Saturn, which remaineth about as many years in one sign, and holdeth the same consideration in years as the moon in days, doth cause the *periculous* periods. *Browne.*

PERIGEE', *n. s.* } Fr. *perigeé;* Gr. περι
PERIGE'UM. } and γη, the earth. A point in the heavens wherein a planet is said to be in its nearest distance possible from the earth.

By the proportion of its motion it was at the creation, at the beginning of Aries, and the *perigeum* or nearest point in Libra. *Browne.*

PERIGORD STONE, an ore of manganese, of a dark gray color, like the basaltes or trapp. It may be scraped with a knife, but is extremely difficult to be broken. It is found of no regular figure, is very compact, heavy, and as black as charcoal. Its appearance is glittering and striated, like the ore of antimony; its particles being disposed in the form of needles, crossing one another without any agglutination, insomuch that some are loose as iron filings when stuck to a loadstone; resembling the scoria from a blacksmith's furnace. By calcination it becomes harder, and of a reddish brown color, but is not magnetic. It has a considerable specific gravity, does not melt per se, but with borax runs

into an amethyst-colored glass. It is scarcely affected by nitrous acid without the addition of sugar. It seems also to contain some argil and iron. It is met with in the ci-devant provinces of Gascony and Dauphiny in France, and in some parts of England. It is employed by the French potters and enamellers in the glassy varnish of their earthen wares.

PERIGRAPHE, a word used to express a careless or inaccurate delineation of any thing.

PERIGRAPHE, in anatomy, is used by Vesalius to express the white lines or impressions that appear on the musculus rectus of the abdomen.

PERIGUEUX, VESUNNA, an ancient and pretty city, the chief place of the department of Dordogne, France, having an inferior court of justice, under the royal court of Bourdeaux, a chamber of commerce, and an agricultural society. It is a bishopric, the principal place of the twentieth military division, and a post town, with 8500 inhabitants. This city stands in a fine valley, on the right bank of the isle, near the confluence of that river with the Vezère. It is encompassed with freestone walls tolerably well built, and contains several remains of ancient monuments, which show its splendor in the time of the Romans. There are some very pleasant walks round the town, and the neighbourhood abounds in excellent game and delicious truffles; Perigueux pies are also highly esteemed, and form a considerable branch of the commerce of the place. The manufactures consist of handkerchiefs, caps, fine liqueurs, &c., and the trade is chiefly in the patés, or pies, and truffles, just mentioned, together with wood, iron, grocery, brandy, game, poultry, and cattle. Here is a public library of 11,000 volumes; the prefect's house of modern construction; a botanical garden; the cathedral; the tower of Vesunna, a circular edifice, 100 feet high, without either door or window (thought to have been anciently the temple of Venus); several remains of antiquity, as an aqueduct, public baths, and several arcades of a large amphitheatre. This is the native place of Boetius and La Grange-Chancelle, celebrated authors. It is seventy-two miles S. S. W. of Limoges, ninety-six E. N. E. of Bourdeaux, fifty-seven south-east of Angoulême, and 364 S. S.W. of Paris; in long. 1° 37′ W., lat. 45° 11′ N.

PERIHE'LIUM, *n. s.* Fr. *perihelie*; Gr. περι and ηλιος, the sun. That point of a planet's orbit wherein it is nearest the sun.

Sir Isaac Newton has made it probable that the comet which appeared in 1608, by approaching to the sun in its *perihelium*, acquired such a degree of heat as to be 50,000 years a cooling.
Cheyne's Philosophical Principles.

PER'IL, *n. s.*
PER'ILOUS, *adj.*
PER'ILOUSLY, *adv.*
PER'ILOUSNESS, *n. s.*
Fr. *peril*; Ital. *pericleo*; Lat. *periculum*. Danger; jeopardy; risk; danger denounced; denunciation: perilous is, hazardous; dangerous; and Shakspeare uses 'parlous' more than once for shrewd or witty, as Dr. Johnson thinks because of the opinion 'that children eminently forward do not live:' but query, Is it not a corruption of peerless? perilously and perilousness follow these senses.

Dear Pirocles, be liberal unto me of those things which have made you indeed precious to the world, and now doubt not to tell of your *perils*. *Sidney.*

How many *perils* do unfold
The righteous man to make him daily fall!
Spenser.

Alterations in the service of God, for that they impair the credit of religion, are therefore *perilous* in common-weals, which have no continuance longer than religion hath all reverence done unto it.
Hooker.

I told her,
On your displeasure's *peril*,
She should not visit you.
Shakspeare's Winter's Tale

A *parlous* boy, go to you are too shrewd.
Id. King Richard III.

In the act what *perils* shall we find,
If either place, or time, or other course,
Cause us to alter the order now assigned.
Daniel

Her guard is chastity;
She that has that is clad in complete steel,
And like a quivered nymph with arrows keen
May trace huge forests and unharboured heaths,
Infamous hills and sandy *perilous* wilds. *Milton.*

Thus was the accomplished squire endued
With gifts and knowledge *per'lous* shrewd.
Hudibras

The love and pious duty which you pay
Have passed the *perils* of so hard a way.
Dryden.

Strong, healthy, and young people are more in *peril* by pestilential fevers than the weak and old.
Arbuthnot.

Dictate propitious to my duteous ear,
What arts can captivate the changeful seer:
For *perilous* the assay, unheard the toil
T' elude the prescience of a God by guile. *Pope.*

Soldiers always live
In idleness or *peril*: both are bad. *Proctor.*

PERIM'ETER, *n. s.* Fr. *perimetre*; Gr. περι and μετρεω. The compass or sum of all the sides which bound a figure.

By compressing the glasses still more, the diameter of this ring would increase, and the breadth of its orbit or *perimeter* decrease, until another new colour emerged in the centre of the last. *Newton.*

PERINÆUM, or PERINEUM, in anatomy, the space between the anus and the parts of generation, divided into two equal lateral divisions by a very distinct line, which is longer in males than females.

PERINSKIOLD (John), a learned Swedish writer, born at Stregnesia in Sudermania, in 1654. He was made professor at Upsal, secretary antiquary of the king of Sweden, and counsellor of the chancery of antiquities. He died in 1720. His principal works are, 1. A History of the Kings of Norway. 2. A History of the Kings of the North. 3. An edition of John Messenius on the Kings of Sweden, Norway, and Denmark, in 14 vols, folio, &c.

PE'RIOD, *n. s.* & *v. a.*
PERIOD'IC, *adj.*
PERIOD'ICAL,
PERIOD'ICALLY, *adv.*
Fr. *periode*; Gr. περιοδος. A circuit; time during which any thing is performed that is continued in series; course of events; a given number of years; length of time; a complete sentence; particularly the end or conclusion of a series; the point or state at which a thing terminates: as a verb to put an end to: periodic and periodical mean circular;

regular; returning at a given period or length of time; relating to periods: periodically, at stated periods.

> If my death might make this island happy,
> And prove the *period* of their tyranny,
> I would expend it with all willingness;
> But mine is made the prologue to their play.
> *Shakspeare.*

> Your letter he desires
> To those have shut him up, which failing to him,
> *Periods* his comfort. *Id. Timon.*

Some experiments would be made how by art to make plants more lasting than their ordinary *period*, as to make a stalk of wheat last a whole year. *Bacon's Natural History.*

Periods are beautiful, when they are not too long: for so they have their strength too as in a pike or javelin. *Ben Jonson.*

> Beauty's empires, like to greater states,
> Have certain *periods* set, and hidden fates.
> *Suckling.*

Light-conserving stones must be set in the sun before they retain light, and the light will appear greater or lesser, until they come to their utmost *period.* *Digby.*

> Is this the confidence you gave me?
> Lean on it safely, not a *period*
> Shall be unsaid for me. *Milton.*

It is implicitly denied by Aristotle in his politics, in that discourse against Plato, who measured the vicissitude and mutation of states by a *periodical* fatality of number. *Browne.*

We stile a lesser space a cycle, and a greater by the name of *period*, and you may not improperly call the beginning of a large *period* the epocha thereof. *Holder on Time.*

Syllogism is made use of to discover a fallacy cunningly wrapt up in a smooth *period.* *Locke.*

There is nothing so secret that shall not be brought to light within the compass of our world; whatsoever concerns this sublunary world in the whole extent of its duration, from the chaos the last period. *Burnet's Theory.*

> What anxious moments pass between
> The birth of plots and their last fatal *periods!*
> Oh! 'tis a dreadful interval of time. *Addison.*

The confusion of mountains and hollows furnished me with a probable reason for those *periodical* fountains in Switzerland which flow only at such particular hours of the day. *Id.*

Was the earth's *periodic* motion always in the same plane with that of the diurnal, we should miss of those kindly increases of day and night. *Derham.*

Astrological undertakers would raise men out of some slimy soil, impregnated with the influence of the stars upon some remarkable and *periodical* conjunctions. *Bentley.*

The three tides ought to be understood of the space of the night and day, then there will be a regular flux and reflux thrice in that time every eight hours *periodically.* *Broome.*

> From the tongue
> The unfinished *period* falls. *Thomson. Spring.*

Tell these, that the sun is fixed in the centre, that the earth with all the planets roll round the sun in their several *periods*; they cannot admit a syllable of this new doctrine. *Watts.*

For the assistance of memories, the first words of every *period* in every page may be written in distinct colours. *Id.*

Four moons perpetually roll round the planet Jupiter, and are carried along with him in his *periodical* circuit round the sun. *Watts on the Mind.*

PERIOD, in astronomy. See ASTRONOMY.

PERIOD, in chronology, denotes a revolution of a certain number of years, or a series of years, whereby, in different nations, and on different occasions, time is measured; such are the following:

1. PERIOD, CALIPPIC, a system of seventy-six years.

2. PERIOD, DIONYSIAN, or Victorian period, a system of 532 lunæ-solar and Julian years; which being elapsed, the characters of the moon fall again upon the same day and feria, and revolve in the same order, according to the opinion of the ancients. This period is otherwise called the great paschal cycle, because the Christian church first used it to fix the true time of the pascha or Easter. The sum of these years arise by multiplying together the cycles of the sun and moon.

3. PERIOD, HIPPARCHUS'S, is a series of 304 solar years, returning in a constant round, and restoring the new and full moons to the same day of the solar year, according to the sentiment of Hipparchus. This period arises by multiplying the Calippic period by four. Hipparchus assumed the quantity of the solar year to be 365 *d.* 5 *h.* 55 *m.* 12*s.*; and hence concluded that in 104 years Calippus's period would err a whole day. He therefore multiplied the period by four, and from the product cast away an entire day. But even this does not restore the new and full moons to the same day throughout the whole period; but they are sometimes anticipated 1 *d.* 8 *h.* 23 *m.* 29½ *s.*

4. PERIOD, JULIAN. See JULIAN.

PERIOD, in grammar, denotes a small compass of discourse, containing a perfect sentence, and distinguished at the end by a point, or full stop, thus (.); and in members or divisions marked by commas, colons (:), &c. Rhetoricians consider period, which treats of the structure of sentences, as one of the four parts of composition. The periods allowed in oratory are three: a period of two members, called by the Greeks dicolos, and by the Latins bimembris; a period of three members, tricols, trimembris; and a period of four, quadrimembris, tetracolos. See PUNCTUATION.

PERIOD, in medicine, is applied in certain diseases which have intervals and returns, to denote an entire course or circle of such disease; or its progress from any state through all the rest till it return to the same again. Galen describes period as a time composed of an intention and remission; whence it is usually divided into two parts, the paroxysm, or exacerbation, and remission. In intermitting fevers, the periods are usually stated and regular; in other diseases, as the epilepsy, gout, &c., they are vague or irregular.

PERIOECI, περιοικοι, in geography, such inhabitants of the earth as have the same latitudes, but opposite longitudes, or live under the same parallel and the same meridian, but in different semicircles of that meridian, or in opposite points of the parallel. These have the same common seasons throughout the year, and the same phenomena of the heavenly bodies; but, when it is noon-day with the one, it is midnight with the

other, there being twelve hours in an east and west direction. These are found on the globe by the hour index, or by turning the globe half round, that is, 180° either way.

PERIOSTEUM, *n. s.* Fr. *perioste ;* Gr. περι and οςεον, a bone.

All the bones are covered with a very sensible membrane, called the *periosteum*. *Cheyne.*

PERIPATETICS, philosophers, followers of Aristotle, and maintainers of the peripatetic philosophy; called also Aristotelians. They were called Peripatetics, from περιπατεω, I walk; because they disputed walking in the Lyceum. A reformed system of the Peripatetic philosophy was first introduced into the schools in the University of Paris, whence it soon spread throughout Europe: and has subsisted in some universities to this day, under the name of school philosophy. The foundation of this is Aristotle's doctrine, often misunderstood, but oftener misapplied: whence the retainers may be denominated Reformed Peripatetics. Out of these have sprung, at various times, several branches; the chief are the Thomists, Scotists, and Nominalists. The Peripatetic system, after having prevailed with great and extensive dominion for many centuries, began rapidly to decline towards the close of the seventeenth, when the disciples of Ramus attacked it on the one hand, and it had still more formidable adversaries to encounter in Descartes, Gassendi, and Newton. See PHILOSOPHY.

PERIPATON, in antiquity, the name of that walk in the Lyceum where Aristotle taught, and whence the name of Peripatetics was given to his followers.

PERIPETIA, in the drama, that part of a tragedy wherein the action is turned, the plot unravelled, and the whole concludes. See CATASTROPHE.

PERIPHERY, *n. s.* Fr. *peripheric;* Gr. περιφερω. Circumference.

Neither is this sole vital faculty sufficient to exterminate noxious humours to the *periphery* or outward parts. *Harvey.*

PERIPHERY. See GEOMETRY.

PE'RIPHRASE, *v. a.* } Gr. περιφρασις; Fr. *periphraser*. To express one word by many; circumlocution: use of many words to express the sense of one.
PERIPH'RASIS, *n. s.* }

She contains all bliss,
And makes the world but her *periphrasis*.
Cleaveland.

They make the gates of Thebes and the mouths of this river a constant *periphrasis* for this number seven. *Browne.*

The *periphrasis* and circumlocutions by which Homer expresses the single act of dying, have supplied succeeding poets with all their manners of phrasing it. *Pope.*

They shew their learning uselessly, and make a long *periphrasis* on every word of the book they explain. *Watts.*

PERIPLOCA, Virginian silk, in botany, a genus of the digynia order and pentandria class of plants; natural order thirtieth, contortæ. The nectarium surrounds the genitals, and sends out five filaments. There are five species, four of which are natives of warm climates, and can only be raised there. The fifth, however, is sufficiently hardy for this climate. The periploca is a fine climbing plant, that will wind itself with its ligneous branches about whatever tree, hedge, pale, or pole is near it; and will arise, by the assistance of such support, to the height of about thirty feet; and where no tree or support is at hand to wind about, it will knit or entangle itself together in a most complicated manner. The stalks of the older branches, which are most woody, are covered with a dark brown bark, whilst the younger shoots are more mottled with the different colors of brown and gray, and the ends of the youngest shoots are often of a light green. The stalks are round, and the bark is smooth. The leaves are the greatest ornament to this plant; for they are tolerably large, and of a good shining green color on their upper surface, and cause a variety by exhibiting their under surface of a hoary cast. Their figure is oblong, or rather more inclined to the shape of a spear, as their ends are pointed, and they stand opposite by pairs on short foot-stalks. Their flowers have a star-like appearance; for, though they are composed of one petal only, yet the rim is divided into segments, which expand in such a manner as to form that figure. Their inside is hairy, as is also the nectarium which surrounds the petal. Four or five of the flowers grow together, forming a kind of umbel. They are of a chocolate color, are small, and are in blow in July and August, and sometimes in September. In the country where this genus grows naturally they are succeeded by a long taper pod, with compressed seeds having down to their tops. The propagation of this climber is very easy; for if the cuttings are planted in a light moist soil, in the autumn or in the spring, they will readily strike root. Three joints at least should be allowed to each cutting; they should be the bottom of the preceding summer's shoot; and two of the joints should be planted deeply in the soil. Another, and a never-failing method, is by layers; for if they are laid down in the ground, or a little soil only loosely thrown over the young preceding summer's shoots, they will strike root at the joints, and be good plants for removing the winter following.

PERIPNEU'MONY, *n. s.* } Gr. περι and πνευμων, the lungs; Fr. *peripneumonie*. Inflammation of the lungs.
PERIPNEUMO'NIA, *n. s.* }

Lungs oft imbibing phlegmatick and melancholick humours are now and then deprehended schirrous, by dissipation of the subtiler parts, and lapidification of the grosser that may be left indurated, through the gross reliques of *peripneumonia* or inflammation of the lungs. *Harvey.*

A *peripneumony* is the last fatal symptom of every disease; for nobody dies without a stagnation of the blood in the lungs, which is the total extinction of breath. *Arbuthnot.*

PERIPNEUMONY, a disease attended with an acute fever, and a difficulty of breathing. See MEDICINE.

PERIRRHANTERIUM, a vessel of stone or brass, which was filled with holy water, and with which all those were sprinkled who were admitted by the ancients to their sacrifices. Beyond this vessel no profane person was allowed to

pass. It was used both by Greeks and Romans, and has been evidently borrowed by the church of Rome. The Hebrews also had a vessel for purification.

PERISCII, in geography, the inhabitants of either frigid zone, between the polar circles and the poles, where the sun, when in the summer signs, moves only round about them, without setting; and consequently their shadows in the same day turn to all the points of the horizon.

PER'ISH, *v. n.* & *v. a.*, PER'ISHABLE, *adj.*, PER'ISHABLENESS, *n. s.* Fr. *perir*; Port. and Span. *perecer*; Lat. *pereo*. To die; be destroyed; come to nothing; be lost; be in a state of constant decay; be eternally lost: as an active verb (obsolete) to destroy; cause to decay: perishable and perishableness follow the senses of the verb neuter, which generally takes *for* or *with* before a cause. and *by* before an instrument.

They *perish* quickly from off the good land. *Deut.* xi. 18.

If I have seen any *perish for* want of cloathing, then let mine arm fall from my shoulder blade. *Job* xxxi. 29.

I *perish with* hunger. *Luke* xv. 17.

These, as natural brute beasts made to be destroyed, speak evil of the things they understand not, and shall utterly *perish*. 2 *Peter*.

I burn, I pine, I *perish*,
If I atchieve not this young modest girl. *Shakspeare.*

The splitting rocks cowered in the sinking sands,
And would not dash me with their ragged sides;
Because thy flinty heart, more hard than they,
Might in thy palace *perish* Margaret. *Id.*

We derogate from his eternal power to ascribe to them the same dominion over our immortal souls, which they have over all bodily substances and *perishable* natures. *Raleigh.*

Rise, prepared in black, to mourn thy *perished* lord. *Dryden.*

Characters drawn on dust, that the first breath of wind effaces, are altogether as useful as the thoughts of a soul that *perish* in thinking. *Locke.*

Exposing their children, and leaving them in the fields to *perish by* want, has been the practice. *Id.*

Duration, and time which is a part of it, is the idea we have of *perishing* distance, of which no two parts exist together, but follow in succession; as expansion is the idea of lasting distance, all whose parts exist together. *Id.*

Suppose an island separate from all commerce but having nothing because of its commonness and *perishableness* fit to supply the place of money: what reason could any have to enlarge possessions beyond the use of his family? *Id.*

To these purposes nothing can so much contribute as medals of undoubted authority not *perishable* by time, nor confined to any certain place. *Addison.*

He was so reserved, that he would impart his secrets to nobody; whereupon this closeness did a little *perish* his understanding. *Collier.*

Human nature could not sustain the reflection of having all its schemes and expectations to determine with this frail and *perishable* composition of flesh and blood. *Rogers.*

So when the lust of tyrant power succeeds,
Some Athens *perishes*, or some Tully bleeds. *Pope.*

Familiar now with grief your ears refrain,
And in the public woe forget your own,
You weep not for a *perished* lord alone. *Id.*

Thrice has he seen the *perishable* kind
Of men decay. *Id. Odyssey.*

It is a prince's greatest present felicity to reign in their subjects' hearts; but these are too *perishable* to preserve their memories, which can only be done by the pens of faithful historians. *Swift.*

PERISTAL'TIC, *adj.* Gr. περιϛελλω, to contract; Fr. *peristaltique*. Contractile in the particular manner described below.

Peristaltick motion is that vermicular motion of the guts, which is made by the contraction of the spiral fibres, whereby the excrements are pressed downwards and voided. *Quincy.*

The *peristaltick* motion of the guts, and the continual expression of the fluids, will not suffer the least matter to be applied to one point the least instant. *Arbuthnot.*

PERISYS'TOLE, *n. s.* Gr. περι and κυϛολη. In medicine, the pause or interval betwixt the two motions of the heart or pulse; namely, that of the systole or contraction of the heart, and that of diastole or dilatation.

PER'ISTYLE, *n. s.* Fr. *peristile*. A circular range of pillars.

The Villa Gordiana had a *peristyle* of two hundred pillars. *Arbuthnot on Coins.*

PERITONEUM, *n. s.* Fr. *peritoine*; Gr. περιτοναιον. A membrane that lies immediately under the muscles of the lower belly, and which encloses all the bowels there contained.

Wounds penetrating into the belly are such as reach no farther inward than to the *peritoneum*. *Wiseman.*

PERITONEUM. See ANATOMY, Index.

PERITONIUM, a town of Egypt, on the west bank of the Nile, reckoned one of the keys of the country. Marc Antony was defeated near it by Cornelius Gallus, a lieutenant of Augustus.

PERITROCHIUM, in mechanics, denotes a wheel or circle, concentric with the base of a cylinder, and moveable together with it about its axis.

PER'JURE, *v. a.* & *n. s.*, PER'JURER, *n. s.*, PER'JURY. Lat. *perjuro*. To forswear; swear falsely; taint with perjury, used with the reciprocal pronoun: it is used as a noun substantive by Shakspeare, and for perjurer, which signifies one who swears falsely: perjury is false swearing; a false oath.

The law is not made for a righteous man, but for the lawless and disobedient, for *perjured* persons. 1 *Tim.* i. 10.

The common oath of the Scythians was by the sword and fire; for that they accounted those two special divine powers, which should work vengeance on the *perjurers*. *Spenser.*

Hide thee, thou bloody hand,
Thou *perjure*, thou similar of virtue,
Thou art incestuous. *Shakspeare. King Lear.*

Who should be trusted now, when their right hand
Is *perjured* to the bosom? *Shakspeare.*

My great father-in-law, renowned Warwick,
Cried aloud—What scourge for *perjury*
Can this dark monarchy afford false Clarence?
And so he vanished. *Id. Richard III.*

Let us consider, that rash and vain swearing is very apt often to bring the practiser of it into that most horrible sin of *perjury*. *Barrow.*

PERJURY, by the common law of England, is a crime committed by one who, being lawfully required to depose the truth in any judicial proceeding, wilfully swears falsely in a point material to the question in dispute. It has, however, been held, that a man may be indicted for perjury for swearing that he *believed* a fact to be true, which he knew to be false. The common law takes no notice of any false swearing, but such as is committed in some court of justice, having power to administer the oath, or before some officer or magistrate invested with similar authority, in some proceeding relative to a civil suit or criminal prosecution; for the law esteems all other oaths unnecessary, at least, and hence will not punish the breach of them. Thus, if a person swears falsely in a voluntary affidavit in any extrajudicial matter, he is not liable to any punishment. By numerous statutes in England and America, the penalties of perjury have been extended to false oaths by electors, bankrupts, insolvent debtors, &c. By the English law, the evidence of one witness alone is not sufficient to convict on an indictment for perjury; in such case, there would be only one oath against another; but it is sufficient if corroborated by other independent evidence. Subornation of perjury is the offence of procuring a man to commit perjury. By the law of Moses (*Deuteronomy* xix. 19), if a man testify falsely against his brother, it shall be done unto him as he had thought to do against his brother. And this is the principle adopted in the laws of many of the states of modern Europe. By the law of the Twelve Tables, "*perjurii pœna divina, exitium; humana, dedecus.*" Gellius, xx. 1, mentions, that some persons who had perjured themselves, by giving false testimony, were thrown from the Tarpeian rock. The civil law punished perjury committed in swearing by the name of God, in civil cases, by infamy (*Digest*, lib. ii, tit. 4; *Code*, lib. xii. tit. 1); but the punishment of perjury committed in swearing by the safety of the emperor, was death (*Code*, iv. 1: 2); by the genius of the prince, beating and scourging (*Dig.* lib. xii. tit. 2, 13). The punishment of perjury, by the common law in England, was, anciently, death; afterwards banishment, or cutting out the tongue; then forfeiture of goods. At the present time, it is fine, imprisonment, and pillory, at the discretion of the court, to which the statute Geo. II, c. 25, adds a power in the court to order the offender to be sent to the House of Correction for a term not exceeding seven years, or to be transported for the same period. The offender is incapacitated from giving evidence in a court of justice; but a pardon will restore his competency. By the law of the U. States, the punishment on conviction for perjury committed in any cause depending in any of the courts of the U. States, or in any deposition taken in pursuance of the laws of the U. States, is imprisonment not above three years, and fine not exceeding £200, pillory one hour, and disqualification for being a witness until the judgment is reversed. By the capitularies of Charlemagne and Louis *le Débonnaire*, perjury was punished by cutting off the hand. By the Napoleon code, perjury in criminal cases is punishable by confinement at hard labor for a limited time. If the party accused is sentenced to a severer punishment, the perjurer is to suffer the like. In cases of correctional or police jurisdiction, it is punishable by confinement. Perjury in civil suits, is punishable by civic degradation. By the Prussian code, promulgated by Frederic William in 1794, whoever, whether he appears as a party or as a witness, perjures himself, is to be excluded for ever from his employments, rights and civil profession, to undergo an ignominious exposition as a perjured person, or to be publicly declared such, and, in addition thereto, to be condemned to confinement from one to three years. If the perjury be with a view to profit the perjurer, he is to forfeit a sum quadruple of that which he endeavoured to obtain. If the perjury is committed in a capital case, and an innocent person is, in consequence, condemned, the punishment of the perjurer is death; and in cases not capital, the punishment of the perjurer is to be proportioned to the crime of which the innocent person was accused and convicted. By the law of Spain (in 1804), perjury, in civil causes, is punishable with ten years' condemnation to the galleys; and in criminal cases, in which the punishment for the offence charged does not extend to death, public infamy and perpetual condemnation to the galleys.

PERIWIG, *n. s.* & *v. a.* Fr. *perruque.* False hair worn by way of ornament or concealment of baldness: to dress in false hair.

PERIWINKLE, *n. s* Barb. Lat. *pervinca* (from its winding shape.) A small shell-fish; a fish snail; also a winding plant, the clematis.

PERIZONIUS (James), a learned and laborious writer, born at Dam in 1651. He became professor of history and eloquence at the university of Franekir, when, by his merit and learning, he made that university flourish. However, in 1693, he went to Leyden, where he was made professor of history, eloquence, and Greek; in which employment he continued till his death, in 1715. He wrote many learned and curious works, particularly Origines Babylonicæ et Egyptiacæ, 2 vols. 8vo. &c. But his work most generally known is the Notes upon Sancta Minerva.

PERIZZITES, ancient inhabitants of Palestine, mingled with the Canaanites. They did not inhabit any certain portion of the land of Canaan; there were some of them on both sides the river Jordan, in the mountains, and the plains.

PERK, *v. n.*, *v. a.* & *adj.* From *perch*, Skinner. To hold up the head with affected briskness; assume airs; dress smartly or proudly: pert; brisk; proud.

PERKINISM, in medicine, is a late and already exploded method of curing head-aches, rheumatisms, quinsies, gouts, lumbagos, cramps, contusions, sprains, tumors, burns, scalds, erysipelas, palsies, and various other diseases and pains in all parts of the body, by drawing metallic tractors over the parts affected; invented by a Dr. Perkins of America. These tractors were made of silver, brass, copper, iron, lead, or zinc; and even of ivory or ebony; and supposed to act as mechanical stimuli, or as galvanic

conductors of electricity. Experiments are said to have been made with success in this way by other physicians and surgeons, particularly Dr. J. C. Tode, physician to the king of Denmark, and professors Herholdt and Rafn, of Copenhagen, who published a Treatise on Perkinism, and first made use of the term.

PER'LOUS, *adj.* Corrupted from perilous Dangerous; hazardous.

PERM, an extensive government, situated chiefly in European, but partly in Asiatic Russia, adjacent to that of Viatka on the west, and Tobolsk on the east; extending from 56° to 62° of N. lat. Its area is 116,000 square miles, or double that of England, while its population does not exceed 1,100,000. It is intersected from north to south by a part of the great Ural chain, and is in general hilly, covered with vast and impenetrable forests. It is divided into twelve districts or circles. Those situated in the south-east are tolerably cultivated, but the rest of the country is fit only for pasture; and an annual import of corn is generally necessary. The exports are cattle, and the copper, iron, and salt of the mines. The inhabitants are a mixed race, partly Russian, and partly Finnish and Tartar. The annual export of metal is computed at 2000 tons of copper, and 70,000 tons of iron. The sea being remote both on the north and south of the rivers; those on the west side of the Ural chain flow into the Kama, which joins the Wolga; those on the east side fall, for the most part, into the Oby, the outlet of which is in the Frozen Ocean. The forests contain various animals, which are hunted for their furs. The inhabitants are partly Christians, partly Mahometans, and, in no inconsiderable degree, Pagans. The ancestors of those of the country between the White Sea and the Ural Mountains are described as a wealthy and powerful nation; but after falling, in the middle ages, under the sway of the republic of Novgorod, they were gradually incorporated into the Russian empire.

PERM, the chief place of the preceding government, is situated on the river Kama, and has some neat public buildings, a public school, and an hospital. It carries on an active traffic with the provinces both to east and west, in the metals of the surrounding country. Population 3800: 910 miles east by south of St. Petersburg, and 720 E. N. E. of Moscow.

PERMACOIL, a town and fortress of the Carnatic, south of India. The fort is situated on a rock from 200 to 300 feet high, and from 400 to 500 yards in breadth. It was first taken by the British in 1760, then made over to the nabob of Arcot, and in the year 1782 was captured by the united forces of Hyder Aly and the French. It remained with them till the end of the war, when it was dismantled, and the fortifications blown up. Long. 79° 52′ E., lat. 12° 13′ N.

PER'MANENCE, or PER'MANENCY, *n. s.* PER'MANENT, *adj.* PER'MANENTLY, *adv.* PER'MANSION, *n. s.* } Lat. *permanens, permaneo.* Duration; abidance; consistency; continuity of state; permanent is lasting; durable; unchanged; the adverb corresponding: permansion (obsolete), continuance.

Such a punctum to our conceptions is almost equivalent to *permanency* and rest. *Bentley.*

PER'MEABLE, *adj.* PERMEA'TION, *n. s.* } Lat. *permeo.* Such as may be passed through.

It entereth not the veins, but taketh leave of the *permeant* parts at the mouth of the meseraicks. *Browne.*

The pores of a bladder are n[illegible] asily *permeable* by [illegible] *Boyle.*

This heat evaporates and elevates the water of the [illegible]yss, pervading not only the fissures, but the very [illegible]dies of the strata, *permeating* the interstices of the [illegible]nd, or other matters whereof they consist. *Woodward's Natural History.*

PERMIS'CIBLE, *adj.* PERMIS'TION, *n. s.* PERMIX'TION. } Latin, *permisceo.* [illegible]apable of being [illegible]ingled or mixed: permistion and permixtion [illegible]ean the act of mixing or mingling; state of being mingled.

They fell into the opposite extremity of one nature in Christ, the divine and human natures in Christ, in their conceits, by *permixtion* and confusion of substances, and of properties growing into one upon their adunation. *Brerewood.*

PERMIT', *v. a.* & *n. s.* PERMIS'SIBLE, *adj.* PERMIS'SION, *n. s.* PERMIS'SIVE, *adj.* PERMIS'SIVELY, *adv.* PERMIT'TANCE, *n. s.* } Fr. *permettre*; Ital. *parmettere*; Lat. *permitto.* To yield; allow; suffer; resign; let; not hinder: a permit is a legal excise ticket of sufferance, or allowance for goods to pass from a place, having paid the duty imposed on them: permissible is allowable; what may be permitted: permission and permittance, allowance; forbearance of opposition; grant of liberty: permissive, granting liberty; not hindering; allowing without upbraiding: permissively, by way of allowance or forbearance to hinder; by bare allowance.

Women keep silence in the churches, for it is not *permitted* unto them to speak. 1 *Cor.* xiv. 34.

What things God doth neither command nor forbid, the same he *permitteth* with approbation either to be done or left undone. *Hooker.*

We bid this be done,
When evil deeds have their *permissive* pass,
And not the punishment. *Shakspeare.*

As to a war for the propagation of the christian faith, I would be glad to hear spoken concerning the lawfulness, not only *permissively*, but whether it be not obligatory to Christian princes to design it. *Bacon's Holy War.*

If this doth authorise usury, which before was but *permissive*, it is better to mitigate usury by declaration, than to suffer it to rage by connivance. *Id. Essays.*

Clad
With what *permissive* glory since his fall
Was left him, or false glitter.
Milton's Paradise Lost.

With thy *permission* then, and thus forewarned,
The willinger I go. *Milton.*

Hypocrisy, the only evil that walks
Invisible, except to God alone
By his *permissive* will, through heaven and earth.
Id.

Nor love thy life, nor hate; but what thou livest,
Live well; how long, how short, *permit* to heaven.
Id.

If the course of truth be *permitted* unto itself, it cannot escape many errours.
Browne's Vulgar Errours.

You have given me your *permission* for this address, and encouraged me by your perusal and approbation.
Dryden.

Ye gilded ghosts, *permit* me to relate
The mystick wonders of your silent state. *Id.*
To the gods *permit* the rest. *Id.*
Whate'er can urge ambitious youth to fight,
She pompously displays before their sight;
Laws, empire, all *permitted* to the sword. *Id.*

We should not *permit* an allowed, possible, great and weighty good to slip out of our thoughts, without leaving any relish, any desire of itself there.
Locke.

Let us not agg[illegible]te our sorrows,
But to the gods [illegible]*it* the events of things.
Addison.

When this system[illegible] air comes, by divine *permittance*, to be corrupt[illegible] by poisonous acrimonious steams, what havock is made in all living creatures!
Derham's Physico-Theology.

After men have acquired as much as the laws *permit* them, they have nothing to do but to take care of the publick. *Swift.*

The officers, in their *permits* for removing exciseable goods, shall express as well the time for which they shall be in force for removing such goods, as the time within which they shall be received into stock by the person to whom they are sent; and if not removed within the time limited (unavoidable accidents excepted), or, in default of such removing, if the *permit* shall not be returned to the officer who granted the same, the person procuring the *permit* shall forfeit treble value of the goods: and if not received into stock, within the time limited, by the person to whom they were *permitted* to be sent, they shall be deemed goods removed without a *permit*.
21 *Geo.* III. c. 55.

PERMUTA'TION, *n. s.* Fr. *permutation*; Lat. *permutatio*. Exchange of one for another.

Gold and silver, by their rarity, are wonderfully fitted for the use of *permutation* for all sorts of commodities. *Ray.*

A *permutation* of number is frequent in languages.
Bentley.

PERNAMBUCO, a province of Brasil, bounded by the Atlantic Ocean north and east, south by Bahia, and east by a desert territory. It is about 470 miles in extent from north to south, and about 370 from east to west; abounding in sugar-cane, cotton, and Brasil wood. The climate is in the interior hot and moist. Hides, cocoa-nuts, ipecacuanha, and a few other drugs, are sent hence; but its chief exports are cotton and sugar. The imports are manufactured goods, earthenware, and other articles of necessity among civilised people. Vessels from the United States arrive at Recife annually, bringing flour, of which great quantities are now consumed, furniture for dwelling houses, and other kinds of lumber; and carrying away sugar, molasses, and rum. The trade to the coast of Africa for slaves is also considerable. During the war between the United States and England, which interrupted this trade, Recife was sometimes distressed for wheat-flour, but a supply was received from Rio Grande.

PERNAMBUCO, or St. Antonio do Recife, a town of Brasil, capital of the province of this name. It consists of three divisions; Recife, St. Antonio, and Boa Vista; the first two of which are situated on two sand-banks, surrounded by the sea, and connected together by a bridge of stone and wood lined with shops; this renders it so narrow that two carriages cannot pass abreast.

The harbour of Recife, called the Mosqueiro, situated on the outward bank, is formed by a reef of rocks which runs parallel with the town, at a small distance. The lower harbour, for vessels of 400 tons and upwards, called the Poco, is dangerous, as it is open to the sea; and the beach opposite is very steep. The port has two entrances: the tide does not rise more than five feet and a half. The principal defence of the town consists in the forts Do Buraco and Do Brum, both built of stone, and situated upon the sands opposite to the two entrances. There is likewise the small fort of Bom Jezus, near to the archway and church of the same name; and upon the south-east point of the sand-bank of St. Antonio stands the large stone fort of Cinco Pontas, but they all are said to be out of order.

The division of Recife, which is that nearest the sea, stands on a long narrow neck of land, which stretches southward from the foot of the hill on which the town of Olinda, about a league distant, is built. In front of this bank runs a reef of rocks. At full tide the waves roll over it; but, being checked by this barrier, they strike the quays and buildings of the town with diminished strength. The second sand-bank, on which is placed the division called St. Antonio, is connected with Boa Vista, situated on the continent, by a narrow wooden bridge. Buildings have only been raised within the protection of the reef. The tide enters between the bridges, and encircles the middle compartment. The view from the houses that look on these waters is very extensive and beautiful; the opposite banks being covered with trees and white-washed cottages, varied by small open spaces and lofty cocoa trees. The Recife division of the town is composed of brick houses, of from three to five stories in height; most of the streets are narrow, but they are paved. In the square is the custom house, a low and shabby building; the sugar-inspection house; a large church, and a coffee-house, in which the merchants assemble to transact commercial affairs. There are two churches in use, one of which is built over the stone arch-way leading from the town to Olinda. Near to this is a small fort, close to the water side, which commands it. To the north is the residence of the port-admiral, with the government timber-yards. The cotton-market, warehouses, &c., are also in this part of the town.

St. Antonio, or the middle town, is composed chiefly of large lofty houses and broad streets. The ground floors are appropriated to shops, warehouses, &c., without windows, the only light they have being admitted from the door; and there exists very little distinction of trades. Here is the governor's palace, once the Jesuits' convent; the treasury; town-hall, and prison; the barracks; the Franciscan, Carmelite, and Penha convents, and several churches, handsomely ornamented. The principal street of Boa Vista is broad and handsome. The rest of this third division consists chiefly of small

houses, extending at intervals to some distance. A long embankment has been made, which connects the sand-bank and town of St. Antonio with the main land to the south and west of Bea Vista. The river Capibaribe discharges its waters into the channel between.

Pernambuco, since the ports of Brasil were thrown open to foreign commerce, has been constantly increasing in opulence. The three divisions of the town contain together about 25,000 inhabitants.

PERNIC'IOUS, *adj.* } Fr. *pernicieux*; Lat.
PERNIC'IOUSLY, *adv.* } *perniciosus*. Mis-
PERNIC'IOUSNESS, *n. s.* } chievous; destructive; ruinous; the adverb and noun substantive corresponding.

Some wilful wits wilfully against their own knowledge, *perniciously* against their own conscience, have taught. *Ascham.*

To remove all out of the church, whereat they shew themselves to be sorrowful, would be, as we are persuaded, hurtful, if not *pernicious* thereunto. *Hooker.*

I call you servile ministers,
That have with two *pernicious* daughters joined
Your high engendered battles, 'gainst a head
So old and white as this.
Shakspeare. King Lear.

All the commons
Hate him *perniciously*, and wish him
Ten fathom deep. *Id. Henry VIII.*

Now, if we were to judge of the several kinds of science by this rule, we should find, 1. Some of them to be very hurtful and *pernicious*. *Mason.*

PERNI'CIOUS, *adj.* } Lat. *pernix*. Quick;
PERNIX, } swift: quickness; cele-
PERNIX'ITY, *n. s.* } rity. Dr. Johnson says, 'A use which I have found only in Milton, and which, as it produces an ambiguity, ought not to be imitated;' yet he supplies the example of the noun substantive from Ray.

Part incentive reed
Provide, *pernicious* with one touch to fire.
Milton.

Others armed with hard shells, others with prickles, the rest that have no such armature endued with great swiftness or *pernicity*. *Ray on the Creation.*

PERNIO, a kibe or chilblain, is a little ulcer, occasioned by cold in the hands, feet, heels, nose, and lips. It will come on when warm parts are too suddenly exposed to cold, or when parts from being too cool are suddenly exposed to a considerable warmth; and has always a tendency to gangrene, in which it frequently terminates. It most commonly attacks children of a sanguine habit and delicate constitution; and may be prevented or removed by such remedies as invigorate the system, and are capable of removing any tendency to gangrene in the constitution.

PERONES, a sort of high shoes which in early times were worn even by senators; but at last were confined to ploughmen and laborers. They were very rudely formed, consisting only of hides undressed, and reaching to the middle of the leg. Virgil mentions the perones as worn by a company of rustic soldiers on one foot only.

PERORA'TION, *n. s.* Lat. *peroratio*. The conclusion of an oration.

What means this passionate discourse?
This *peroration* with such circumstances?
Shakspeare.

True women to the last—my *peroration*
I come to speak in spite of suffocation. *Smart.*

PERORATION, in rhetoric, consists of two parts. 1. Recapitulation; wherein the substance of what was diffused throughout the whole speech is collected briefly and cursorily, and summed up with new force and weight. 2. The moving the passions; which is so peculiar to the peroration that the masters of the art call this part sedes affectuum. See ORATORY.

PEROTIS, in botany, a genus of the digynia order, belonging to the triandria class of plants; and in the natural method ranking under the fourth order, gramina. There is no calyx: the corolla consists of a bivalvular glume; the valves are oblong, acute, somewhat unequal, and terminating in a sharp beard: it has three capillary stamina; the antheræ incumbent; the style capillary, and shorter than the corolla; the stigma feathery and divaricated. The corolla serves as a perianthium, including a single seed of an oblong linear shape. Of this there is only one species; viz. P. plumosus, a native of America.

PEROUSE (John Francis Galaup, de la) a French navigator, distinguished for his mysterious fate, was born at Albi, in Languedoc, in 1741, and entered at an early age into the naval service. During the American war he had the command of an expedition to Hudson's Bay; and, on the restoration of peace, the French government having determined on a voyage of discovery, M. de la Perouse was fixed on to command it. Two vessels, the Boussole and the Astrolabe, were placed under his direction; and, leaving France in 1785, proceeded to the South Sea. Having visited the coast of California, he crossed the Pacific, to continue his researches on the coasts and islands of Asia. In April, 1787, he sailed from Manilla towards the north; and at length, on the 6th of September, arrived at the harbour of St. Peter and St. Paul, Kamtschatcha. Here he stayed to refit the ships, and experienced the utmost hospitality from the local authorities. The commander had also the satisfaction to receive letters from France, informing him that he had been promoted to the rank of commodore, which event the governor of Kamtschatcha celebrated by a salute of artillery. From St. Peter and St. Paul Perouse sent copies of his journals, &c., to France, by M. de Lesseps, who proceeded over land across Siberia; and on the 30th of September the vessels sailed. They crossed the equinoctial line, without meeting with any land till the 6th of December, when they saw the Navigators' Islands, and a few days after landed at Maouna. Here M. de Langle, the captain of the Astrolabe, Lamanon, the naturalist attached to the expedition, and ten other persons, were killed in an unprovoked attack of the natives. After this Perouse visited Oyolava, and then steered for the coast of New Holland; and, on the 26th January, 1788, anchored in Botany Bay, at the time governor Philip, with the whole of the colonists, was sailing out to Port Jackson. The French did not leave Botany Bay until March, when the commodore wrote, stating his

intention to continue his researches till December, when he expected to arrive at the Isle of France. This was the latest direct intelligence received of him: and M. d'Entrecasteaux, who was despatched by the French government, in 1791, in search of Perouse, was unable to trace the course he had taken. Subsequently, however, a notice has been published by the French minister of marine, purporting that an American captain had declared that he had seen, in the hands of one of the natives of an island between Louisiade and New Caledonia, a cross of the order of St. Louis, and some medals, which appeared to have been procured from La Perouse's vessels. In consequence of this information, the commander of a vessel which sailed from Toulon, in April 1826, received orders to make researches in the quarter specified. Other intelligence, relative to the wreck of two large vessels, on two different islands of the New Hebrides, was obtained by our captain Dillon at Tucopia, in his passage from Valparaiso to Pondicherry, in May 1826, in consequence of which that officer was despatched to the New Hebrides to ascertain the authenticity of the report he received. Many memorials of Perouse have since been discovered, which plainly prove the loss of the navigator and his vessel. The voyage of La Perouse was published at Paris, 1797, in 4 vols. 4to.

PERPEND', *v. a.* Lat. *perpendo.* To weigh exactly; weigh in the mind; consider attentively.

Thus it remains and the remainder thus;
Perpend. *Shakspeare. Hamlet.*

Perpend, my princess, and give ear. *Shakspeare.*

Consider the different conceits of men, and duly *perpend* the imperfection of their discoveries. *Browne.*

Unto reasonable *perpensions* it hath no place in some sciences. *Browne's Vulgar Errours.*

PERPENDICULAR, *adj.* }
PERPENDIC'ULARLY, *adv.* }
PERPENDICULAR'ITY, *n. s.* } Fr. *perpendiculaire*; Lat. *perpendicularis.* Crossing at right angles; particularly crossing the horizon at right angles: perpendicularity is the state of being perpendicular.

Ten masts attacht make not the altitude,
Which thou hast *perpendicularly* fallen.
Shakspeare.

Some define the *perpendicular* altitude of the highest mountains to be four miles. *Browne.*

Irons refrigerated north and south, not only acquire a directive faculty, but if cooled upright and *perpendicularly*, they will also obtain the same. *Browne's Vulgar Errours.*

Shoot up an arrow *perpendicularly* from the earth, the arrow will return to your foot again. *More.*

All weights naturally move *perpendicularly* downward. *Ray.*

The angle of incidence, is that angle which the line, described by the incident ray, contains with the *perpendicular* to the reflecting or refracting surface at the point of incidence. *Newton's Opticks.*

Though the quantity of water thus rising and falling, be nearly constant as to the whole, yet it varies in the several parts of the globe; by reason that the vapours float in the atmosphere, and are not restored down again in a *perpendicular* upon the same precise tract of land. *Woodward.*

The meeting of two lines is the primary essential mode or difference of an angle; the *perpendicularity* of these lines is the difference of a right angle. *Watts's Logic.*

If in a line oblique their atoms rove,
Or in a *perpendicular* they move;
If some advance not slower in their race,
And some more swift, how could they be entangled? *Blackmore.*

PE'RPETRATE, *v. a.* }
PERPETRA'TION, *n. s.* } Fr. *perpetrer*; Lat *perpetro.* To commit; act: almost always used in an ill sense: but see the extract from Butler.

A desperate discontented assassinate, would, after the *perpetration*, have honested a mere private revenge. *Wotton.*

Success, the mark no mortal wit,
Or surest hand can always hit;
For whatsoe'er we *perpetrate*,
We do but row, we're steered by fate.
Hudibras.

My tender infants or my careful sire,
These they returning will to death require,
Will *perpetrate* on them the first design,
And take the forfeit of their heads for mine.
Dryden.

The forest, which, in after times,
Fierce Romulus, for *perpetrated* crimes,
A sacred refuge made. *Id.*

Hear of such a crime
As tragick poets, since the birth of time,
Ne'er feigned a thronging audience to amaze;
But true, and *perpetrated* in our days.
Tate's Juvenal.

A woman who lends an ear to a seducer may be insensibly drawn into the *perpetration* of the most violent acts. *Clarissa.*

PERPETUAL, *adj.* }
PERPET'UALLY, *adv.* }
PERPET'UATE, *v. a.* }
PERPETU'ITY, *n. s.* } Fr. *perpetuel, perpetuer*; Ital., Span., and Lat. *perpetuo.* Incessant; uninterrupted; eternal, with respect to futurity: always operating: perpetually, the corresponding adverb: to perpetuate is to preserve from extinction or decay; to eternise; continue without cessation: perpetuation, the act of making, and perpetuity, the state of being, perpetual.

For men to alter those laws, which God for *perpetuity* hath established, were presumption most intolerable. *Hooker.*

Yet am I better
Than one that's sick o' the gout, since he had rather
Groan so in *perpetuity*, than be cured
By the sure physician, death.
Shakspeare. Cymbeline.

Time as long again
Would be filled up with our thanks;
And yet we should, for *perpetuity*,
Go hence in debt. *Id. Winter's Tale.*

Nothing wanted to his noble and heroical intentions, but only to give *perpetuity* to that which was in his time so happily established. *Bacon.*

The strokes of divine vengeance, or of men's own consciences, always attend injurious *perpetrations*.
King Charles.

A *perpetual* screw hath the motion of a wheel and the force of a screw, being both infinite.
Wilkins's Mathematical Magick.

Within those banks rivers now
Stream, and *perpetual* draw their humid train.
Milton.

Nourishing hair upon the moles of the face is the *perpetuation* of a very ancient custom. *Browne.*

There can be no other assurance of the *perpetuity* of this church, but what we have from him that built it *Pearson.*

What is it, but a continued *perpetuated* voice from heaven, resounding for ever in our ears? to give men no rest in their sins, no quiet from Christ's importunity, till they awake from their lethargick sleep, and arise from so mortiferous a state, and permit him to give them life. *Hammond.*

Under the same moral, and therefore under the same *perpetual* law. *Holyday.*

A cycle or period begins again as often as it ends, and so obtains a *perpetuity.* *Holder.*

Mine is a love, which must *perpetual* be,
If you can be so just as I am true. *Dryden.*

This verse is every where sounding the very thing in your ears; yet the numbers are *perpetually* varied, so that the same sounds are never repeated twice. *Id*

What the gospel enjoins is a constant disposition f mind to practise all Christian virtues, as often as time and opportunity require; and not a *perpetuity* of exercise and action; it being impossible at one and the same time to discharge variety of duties. *Nelson.*

The ennobling property of the pleasure, that accrues to a man from religion, is, that he that has the property, may be also sure of the *perpetuity.* *South.*

Medals, that are at present only mere curiosities, may be of use in the ordinary commerce of life, and at the same time *perpetuate* the glories of her majesty's reign. *Addison.*

In passing from them to great distances, doth it not grow denser and denser *perpetually*; and thereby cause the gravity of those great bodies towards one another? *Newton's Optics.*

The laws of God as well as of the land
Abhor a *perpetuity* should stand;
Estates have wings, and hang on fortune's power. *Pope.*

The bible and common prayer-book in the vulgar tongue, being *perpetually* read in churches, have proved a kind of standard for language, especially to the common people. *Swift.*

Man cannot devise any other method so likely to preserve and *perpetuate* the knowledge and belief of a revelation so necessary to mankind. *Forbes.*

O ye blest scenes of permanent delight!
Full above measure! lasting beyond bound!
A *perpetuity* of bliss is bliss. *Young.*

PERPIGNAN, Ruscino, an ancient, large, and strong post town, and the principal place of the department of the Eastern Pyrenees, France, containing 15,800 inhabitants. It has an inferior court of judicature, under the royal court of Montpellier, a chamber of commerce, a mint, a superintendency of the customs, an agricultural society, a society of arts, a communal college, and a school for drawing architectural. This town is pleasantly situated on the right bank of the Tet, at its junction with the Baisse. It is built at the foot and on the declivity of a hill, which overlooks a magnificent plain, to the west of which rises the Canigon, one of the highest of the Pyrenean mountains; to the north the Corbieres mountains; to the east the sea, hidden by a range of verdant hills, and to the south the road to Catalonia. The temperature is quite warm: at a few leagues from the town the orange grows in the open field, and even in the valley, in which it stands; the olive trees form immense orchards, extending to the foot of the Canigou; so that while this mountain rears its peak, covered with snow, its base is clothed with the richest produce of the south. The town, though not well built, presents an agreeable aspect; there are several fine public buildings in it, and some fine walks recently planted.

This place is of the greatest importance, as it forms the pass from Roussillon into Catalonia. Its fortifications, considerably augmented by Vauban, were almost entirely renewed in 1823; and the citadel, so situated as to command the town, has been rendered very strong, and capable of resisting successive attacks. At different periods Perpignan has sustained sieges, which put the constancy and courage of its inhabitants to the severest trial. The most memorable of these was in 1475, under Louis XI., which has been compared to those of Saguntum and Numantia; for eight months the people suffered all the horrors of famine, and at last the place was taken by storm. It was besieged without success in 1542, in the reign of Francis I., by an army of 400,000 men. In 1642 Louis XIII. took it after a siege of three months. This is the native town of Carrere, the celebrated physician, and the painter Rigaud.

Here are manufactures of cloth, woollen stuffs, lace, cork, and leather; and a trade is carried on in Rivesalses wines, brandy, grain, oil, fine wool, iron, silk, corks, &c. There is a very flourishing fold here, in which are 150 Thibetian goats. The public places are the library, containing 13,000 volumes, the cabinets of natural history and philosophy, the place d'armes, a grand rectangle, one side of which is occupied by barracks capable of containing 5000 men; the royal square, the town-hall, the justice-hall, the beautiful walk between the glacis of the town and the watering canal, the bridge over the Tet and the citadel, where there is a very deep well to which you descend by a flight of stairs; it is supplied by a fountain, inexhaustible in the greatest droughts. Perpignan is eighty-one miles south-east of Carcassone, forty-five south of Narbonne, thirty-three east of Prades, twenty-four north-west of Port-Vendre, and 705 south of Paris, in long. 0° 34′ E., lat. 42° 42′ N.

PERPLEX′, *v. a.* & *adj.*
PERPLEX′EDLY, *adv.*
PERPLEX′EDNESS, *n. s.*
PERPLEX′ITY.
} Fr. *perplex;* Ital. *perplesso;* Lat. *perplexus.* To embarrass; entangle; distract; torment; vex; involve; make intricate; complicate: as an adjective, intricate; complicated; difficult; but perplexed is the modern and better word: perplexedly and perplexedness follow the senses of the adjective: perplexedness and perplexity mean embarrasment; intrication; involution of affairs or of mind.

Being greatly *perplexed* in his mind, he determined to go into Persia. 1 *Mac.* iii. 31.

The fear of him ever since hath put me into such *perplexity,* as now you found me. *Sidney.*

The royal virgin, which beheld from far,
In pensive plight and sad *perplexity,*
The whole atchievement of this doubtful war,
Came running fast to greet his victory. *Spenser.*

Perplexity not suffering them to be idle, they think and do, as it were, in a phrensy. *Hooker.*

Themselves with doubts the day and night *perplex*
Denham.

Their way
Lies through the *perplexed* paths of the drear wood.
Milton.

How the soul directs the spirits for the motion of the body, according to the several animal exigents, is *perplex* in the theory. *Glanville's Scepsis.*

Let him look for the labyrinth; for I cannot discern any, unless in the *perplexity* of his own thoughts. *Stillingfleet.*

He *perplexes* the minds of the fair sex with nice speculations of philosophy, when he should engage their hearts. *Dryden.*

I ask whether the connection of the extremes be not more clearly seen, in this simple and natural disposition, than in the *perplexed* repetitions and jumble of five or six syllogisms? *Locke.*

What was thought obscure, *perplexed*, and too hard for our weak parts, will lie open to the understanding in a fair view. *Id.*

Obscurity and *perplexedness* have been cast upon St. Paul's Epistles from without. *Id.*

We both are involved
In the same intricate *perplext* distress. *Addison.*

Chloe's the wonder of her sex,
'Tis well her heart is tender,
How might such killing eyes *perplex*,
With virtue to defend her. *Granville.*

My way of stating the main question is plain and clear; yours obscure and ambiguous: mine is fitted to instruct and inform; yours to *perplex* and confound a reader. *Waterland.*

Hard task! for one who lately knew no care,
And harder still as learned beneath despair;
His hours no longer pass unmarked away,
A dark importance saddens every day;
He hears the notice of the clock, *perplexed*,
And cries, Perhaps eternity strikes next. *Cowper.*

PER'QUISITE, *n. s.* } Lat. *perquisitus.*
PER'QUISITED, *adj.* } Something above regular wages or gains: supplied with perquisites.

But what avails the pride of gardens rare,
However royal, or however fair,
If *perquisited* varlets frequent stand,
And each new walk must a new tax demand? *Savage.*

Tell me, perfidious, was it fit
To make my cream a *perquisite*,
And steal to mend your wages? *Widow and Cat.*

To an honest mind, the best *perquisites* of a place are the advantages it gives a man of doing good. *Addison.*

To what your lawful *perquisites* amount. *Swift.*

PERQUISITE, in law, is any thing gotten by a man's own industry, or purchased with his money; in contradistinction to what descends to him from his father or other ancestor.

PERRAULT (Charles), son of an advocate in parliament, was born at Paris, in 1626. Colbert chose him first clerk of the buildings, of which he was superintendant, and afterwards made him comptroller-general of the finances under him. He was one of the first members of the academy of belles lettres and inscriptions, and was received into the French academy in 1671. His poems La Peinture, and La siecle de Louis le Grand, are well known. He drew up elegies of great men of the seventeenth century, with portraits, and produced other esteemed works.

PERRAULT (Claude), brother of Charles, was born at Paris in 1613; and was bred a physician, though he never practised but among his relations, friends, and the poor. He excelled in architecture, painting, sculpture, mathematics, physics, and all those arts that relate to designing and mechanics. When the academy of sciences was established, he was one of its first members, and was chiefly depended on for mechanics and natural philosophy. His works are, A French translation of Vitruvius; Memoires pour servir à l' Histoire Naturelle des Animaux, fol. 1676, with figures; Essais de Phisique, 4 vols. 12mo, 1688; Recueil des Plusieurs Machines de nouvelle Invention, 4to. 1700, &c. He died in 1688.

PERRAULT (Nicholas and Peter), brothers of the two last, made themselves also known in the literary world.

PERRON (James Davy Du), a cardinal distinguished by his abilities and learning, born in Bern, in 1556; and educated by Julian Davy, his father, a very learned Calvinist. Philip Desportes, abbot of Tyron, made him known to Henry III. king of France, who conceived a great esteem for him. Some time after Du Perron abjured Calvinism, and embraced the ecclesiastical function. After the murder of Henry III. he retired to the house of cardinal de Bourbon, and took great pains in bringing back the Protestants to the church of Rome. He chiefly contributed to engage Henry IV. to change his religion: and that prince sent him to negociate his reconciliation to the holy see, in which he succeeded. Du Perron was consecrated bishop of Evreux while he resided at Rome. He was made cardinal in 1604 by pope Clement VIII. at the solicitation of Henry IV. who afterwards nominated him to the archbishopric of Sens. He also sent him to Rome with cardinal Joyense, in order to terminate the disputes between Paul V. and the Venetians. He died at Paris in 1618. His works were collected after his death, and published at Paris in 3 vols. folio.

PERROT (Nicholas), lord of Ablancourt, a man of uncommon genius, born at Chalons in 1606. After studying philosophy about three years he was sent to Paris to follow the law. At eighteen years of age he was admitted advocate of parliament, but soon discontinued his practice. In 1637 he was admitted a member of the French academy; he died in 1664. His works are mostly translations.

PERRUKE, PERUKE, or PERIWIG, was anciently a name for a long head of natural hair; such, particularly, as there was care taken in the adjusting and trimming of. The Latins called it coma; whence part of Gaul took the denomination of Gallia Comata, from the long hair which the inhabitants wore as a sign of freedom. The word is now used for a set of false hair, curled, buckled, and sewed together on a frame or cawl; anciently called capillamentum or 'false peruke.' The ancients used false hair, but the use of perukes, in their present mode, has not existed two centuries.

PERRY, *n. s.* Fr. *poirè*, from *poire*; Belg. *peerdranck*. Cyder made of pears.

Perry is the next liquor in esteem after cyder, in the ordering of which, let not your pears be over ripe before you grind them; and with some sorts of pears, the mixing of a few crabs in the grinding is of great advantage, making *perry* equal to the redstreak cyder. *Mortimer.*

PERRY, the best pears for perry are those which are most tart and harsh. Of these the Bosbury pear, the Bareland pear, and the horse pear, are the most esteemed for perry in Worcestershire, and the squash pear in Gloucestershire.

PERRY (Captain John), an engineer, who resided long in Russia, having been recommended to the czar Peter, while in England, as a person capable of serving him on a variety of occasions relating to his new design of establishing a fleet, making his rivers navigable, &c. He was author of The State of Russia, 1716, 8vo., and An Account of the stopping of Daguebam Breach, 1721, 8vo. He died February 11th, 1733.

PERRY (James), an English journalist, was born at Aberdeen, October 30th, 1756. After receiving his education in the high school of that place, he was entered of the Marischal College, with a view to the law; but the failure of his father, who was a builder, put an end to that design, and in 1774 he went successively to Edinburgh and to Manchester, as a mercantile clerk; but in 1777 he pushed on in quest of fortune to London. Here he became a writer in The General Advertiser, which paper prospered well under his management. In 1782 he became the first editor of The European Magazine, in which he had Dr. William Thomson for a coadjutor, though the work did not answer till Mr. Isaac Reed undertook the management. Mr. Perry now engaged in conducting The Gazetteer, and was also the editor of Debrett's Parliamentary Debates. At length he purchased The Morning Chronicle, which paper made his fortune. He died at Brighton, December 4th, 1821. He was twice the object of a public prosecution, once for publishing the Resolutions of the Derby Meeting; and secondly, for a paragraph respecting his late majesty then prince of Wales. On the former occasion he was defended by lord Erskine; on the latter he pleaded his own cause with great ability, and both times obtained a verdict of acquittal. For many years the Morning Chronicle, under the management of Mr. Perry, might be deemed a sort of official organ of the Whig opposition, a feature which it immediately lost on his death.

PER'SECUTE, *v. a.* } Fr. *persecuter*, of
PERSECU'TION, *n. s.* } Lat. *persecutus*; Ital.
PERSECUTOR. } *perseguire*; Span. and
Port. *persequir*; of barb. Lat. *persequi*. To pursue intently, hence malignantly; harass with penalties; importune: the nouns follow these senses.

Our necks are under *persecution*; we labour and have no rest. *Lamentations* v. 5.

The Jews raised *persecution* against Paul and Barnabas, and expelled them. *Acts* xiii. 50.

I *persecuted* this way unto the death. *Id.* xxii.

They might have fallen down, being *persecuted* of vengeance, and scattered abroad. *Wisdom* xi. 20.

Heavy *persecution* shall arise
On all, who in the worship severe
Of spirit and truth. *Milton.*
What man can do against them not afraid,
Though to the death; against such cruelties
With inward consolations recompensed;
And oft supported so, as shall amaze
Their proudest *persecutors*. *Id. Paradise Lost.*

He endeavoured to prepare his charge for the reception of the impending *persecution*; that they might adorn their profession, and not at the same time suffer for a cause of righteousness, and as evil doers. *Fell.*

Relate,
For what offence the queen of heaven began
To *persecute* so brave, so just a man. *Dryden.*

Christian fortitude and patience had their opportunity in times of affliction and *persecution*. *Sprat.*

The deaths and sufferings of the primitive Christians had a great share in the conversion of those learned Pagans, who lived in the ages of *persecution*. *Addison.*

Henry rejected the pope's supremacy, but retained every corruption besides, and became a cruel *persecutor*. *Swift.*

PERSECUTION, in a more restrained sense, is the sufferings of Christians on account of their religion. Historians usually reckon ten general persecutions, the first of which was under the emperor Nero, thirty-one years after our Lord's ascension; when that emperor, having set fire to the city of Rome, threw the odium of that execrable action on the Christians, who under that pretence were wrapped up in the skins of wild beasts and worried and devoured by dogs; others were crucified, and others burnt alive. The second was under Domitian, in the year 95. In this persecution, St. John the apostle was sent to the isle of Patmos, in order to be employed in digging in the mines. The third began in the third year of Trajan, in the year 100, and was carried on with great violence for several years. The fourth was under Antoninus the philosopher, when the Christians were banished from their houses, forbidden to show their heads, reproached, beaten, hurried from place to place, plundered, imprisoned, and stoned. The fifth began in the year 197, under the emperor Severus. The sixth began with the reign of the emperor Maximinus in 235. The seventh, which was the most dreadful persecution that had ever been known in the church, began in the year 250, in the reign of the emperor Decius, when the Christians were in all places driven from their habitations, stripped of their estates, tormented with racks, &c. The eighth began in the year 257, in the fourth year of the reign of Valerian. The ninth was under the emperor Aurelian, A. D. 274; but this was very inconsiderable; and the tenth began in the nineteenth year of Dioclesian, A. D. 303. In this dreadful persecution, which lasted ten years, houses filled with Christians were set on fire, and whole droves were tied together with ropes, and thrown into the sea.

PERSEPOLIS, formerly the capital of Persia, situated in N, lat. 30° 30′ E., long. 84°; now in ruins, but still remarkable for the most magnificent remains of a palace or temple that are now perhaps to be found in the world. This city stood in one of the finest plains in Persia, being eighteen or nineteen leagues in length, and in different places, two, four, or six leagues in breadth. It is watered by the great river Araxes, now Bendemir, and by a multitude of rivulets besides. Within the compass of this plain are between 1000 and 1500 villages, all adorned with pleasant gardens, and planted with shady trees. The entrance of this plain on the west side has received as much grandeur from

nature, as the city it covers could do from industry or art. It consists of a range of mountains steep and high, four leagues in length, and about two miles broad, forming two flat banks, with a rising terrace in the middle, the summit of which is perfectly plain and even, all of native rock. In this there are such openings, and the terraces are so fine and so even, that one would be te[illegible]pt[illegible] to think the whole the work of art, if th[illegible] gre[illegible] extent, and prodigious elevation thereof, did not convince one that it is a wonder too great for aught but nature to produce. Undoubtedly these banks were the very place where the advanced guards from Persepolis took post, and from which Alexander found it so difficult to dislodge them. One cannot from hence descry the ruins of the city, because the banks are too high to be overlooked: but one can perceive on every side the ruins of walls and of edifices, which heretofore adorned the range of mountains of which we are speaking. On the west and on the north this city is defended in the like manner: so that, considering the height and evenness of these banks, one may safely say that there is not in the world a place so fortified by nature.

The mountain Rehumut, in the form of an amphitheatre, encircles the palace, which is one of the noblest and most beautiful pieces of architecture remaining of all antiquity. Authors and travellers have been exceedingly minute in their descriptions of these ruins; and yet some of them have expressed themselves so differently from others, that, had they not agreed with respect to the latitude and longitude of the place, one would be tempted to suspect that they had visited different spots. These ruins have been described by Garcias de Silva Figueroa, Pietro de la Valle, Chardin, Le Brun, and Mr. Franklin. We shall adopt the description of the latter, as being exceedingly distinct, and given by a traveller intelligent and unassuming.

The ascent to the columns is by a grand staircase of blue stone containing 104 steps. The first objects that strike the beholder on his entrance are two portals of stone, about fifty feet in height each; the sides are embellished with two sphinxes of an immense size, dressed out with a profusion of bead work, and, contrary to the usual method, they are represented standing. On the sides above are inscriptions in an ancient character, the meaning of which no one hitherto has been able to decipher.

At a small distance from these portals you ascend another flight of steps, which lead to the grand hall of columns. The sides of this staircase are ornamented with a variety of figures in basso-relievo; most of them have vessels in their hands; here and there a camel appears, and at other times a kind of triumphal car, made after the Roman fashion; besides these are several led horses, oxen, and rams, that at times intervene and diversify the procession. At the head of the staircase is another basso-relievo, representing a lion seizing a bull; and close to this are other inscriptions in ancient characters. On getting to the top of this staircase, you enter what was formerly a most magnificent hall; the natives have given this the name of chehul minar, or forty pillars; and, though this name is often used to express the whole of the building, it is more particularly appropriated to this part of it. Although a vast number of ages have elapsed since the foundation, fifteen of the columns yet remain entire; they are from seventy to eighty feet in height, and are masterly pieces of masonry: their pedestals are curiously worked, and appear little injured by the hand of time. The shafts are enfluted up to the top, and the capitals are adorned with a profusion of fret-work. From this hall you proceed along eastward, until you arrive at the remains of a large square building, to which you enter through a door of granite. Most of the doors and windows of this apartment are still standing; they are of black marble, and polished like a mirror: on the sides of the doors, at the entrance, are bassi-relievi of two figures at full length; they represent a man in the attitude of stabbing a goat: with one hand he seizes hold of the animal by the horn, and thrusts a dagger into his belly with the other; one of the goat's feet rests upon the breast of the man, and the other upon his right arm. This device is common throughout the palace. Over another door of the same apartment is a representation of two men at full length; behind them stands a domestic holding a spread umbrella: they are supported by large round staffs, appear to be in years, have long beards, and a profusion of hair upon their heads. At the south-west entrance of this apartment are two large pillars of stone, upon which are carved four figures; they are dressed in long garments, and hold in their hands spears ten feet in length. At this entrance also the remains of a staircase of blue stone are still visible. Vast numbers of broken pieces of pillars, shafts, and capitals are scattered over a considerable extent of ground, some of them of such enormous size that it is wonderful to think how they could have been brought whole and set up together. Indeed, all the remains of these noble ruins indicate their former grandeur and magnificence, truly worthy of being the residence of a great and powerful monarch.

These noble ruins are now the shelter of beasts and birds of prey. Besides the inscription abovementioned, there are others in Arabic, Persian, and Greek. Dr. Hyde observes that the inscriptions are very rude and artless; and that some, if not all of them, are in praise of Alexander the Great; and therefore are later than that conqueror.

PERSES, the last king of Macedonia. See MACEDON.

PERSEVE'RE, *v. n.*, PERSEVE'RANCE, *n. s.*, PERSEVE'RANT, *adj.* } Fr *persevrer*; Ital. *perseverare*; Span. and Port. *perseverar*; Lat. *persevero*. To persist; continue; be constant in a design or attempt: perseverance is persistence; continuance; constancy in good or ill: perseverant, constant; persisting.

> But my rude musick, which was wont to please
> Some dainty ears, cannot with any skill
> The dreadful tempest of her wrath appease,
> Nor move the dauphin from her stubborn will;
> But in her pride she doth *persevere* still. *Spenser.*

> The king-becoming graces
> Bounty, *perseverance*, mercy, lowliness;
> I have no relish of them. *Shakspeare. Macbeth.*

They hate repentance more than *perseverance* in a fault. *King Charles.*

We place the grace of God in the throne, to rule and reign in the whole work of conversion, *perseverance*, and salvation. *Hammond.*

Thrice happy, if they know
Their happiness, and *persevere* upright! *Milton.*

Thus beginning thus we *persevere*;
Our passions yet continue what they were. *Dryden.*

Wait the seasons of Providence with patience and *perseverance* in the duties of our calling, what difficulties soever we may encounter. *L'Estrange.*

To *persevere* in any evil course makes you unhappy in this life, and will certainly throw you into everlasting torments in the next. *Wake.*

Patience and *perseverance* overcome the greatest difficulties. *Clarissa.*

And *perseverance* with his battered shield. *Brooke.*

PERSEVERANCE, in theology, a continuance in a state of grace to a state of glory. About this subject there has been much controversy in the Christian church. All divines, except Unitarians, admit that no man can ever be in a state of grace without the co-operation of the Spirit of God; but the Calvinists and Arminians differ widely as to the nature of this co-operation. The former, at least such as call themselves the true disciples of Calvin, believe that those who are once under the influence of divine grace can never fall totally from it, or die in mortal sin. The Arminians, on the other hand, contend that the whole of this life is a state of probation; that without the grace of God we can do nothing that is good; that the Holy Spirit assists, but does not overpower our natural faculties; and that a man, at any period of his life, may resist, grieve, and even quench the Spirit. See THEOLOGY.

PERSEUS, in fabulous history, the son of Jupiter by Danae, the daughter of king Acrisius. See ACRISIUS and DANAE. Many miracles are related of this hero by the poets. Having engaged to bring the head of Medusa to Polydectes king of Seriphos, who had educated him, Minerva gave him her shield, Mercury lent him his wings and caduceus, with his dagger made of diamonds called herpe; and Pluto lent him his helmet, which rendered him invisible. Thus equipped, Perseus flew through the air, visited the Graiæ, and their sisters the Gorgons; killed Medusa, and brought away her head; gave birth to Pegasus and Chrysaor from her blood; turned the giant Atlas into a mountain by a sight of her head; killed the sea monster that was going to devour Andromeda; married that princess; changed her uncle Phineus and his troops, who were going to carry her off from him, into stones; and made the same metamorphosis upon Polydectes when he was going to ravish Danae. Having afterwards killed his grandfather Acrisius accidentally, by throwing a quoit, he refused to succeed him in the throne of Argos, and exchanged it for that of Tirynthus; after which he founded the city of Mycenæ, of which he became king, and where he and his posterity reigned for 100 years. He flourished, according to most chronologists, in 1348 B.C.; but according to Sir Isaac Newton only in 1028.

PERSEUS, in astronomy. See ASTRONOMY.

PERSEUS. See MACEDON. This unfortunate monarch left a daughter and two sons, Philip and Alexander. The latter was bred a carpenter, but, having acquired some learning, became secretary to the senate of Rome.

PERSHORE, or PEARSHORE, an ancient market town of Worcestershire, is situated on the north side of the river Avon, 103 miles north-west by west from London, on the direct road to Worcester. It consists of two parochial divisions; viz. the vicarage of St. Andrew, and the chapelry of Holy Cross. Pershore is a town of great antiquity, and is said to have derived its name from the number of pear-trees which grow in its vicinity. According to bishop Tanner, Oswald, a nephew of Ethelred, king of Mercia, founded a monastery here in 689; but William of Malmsbury asserts that Egelward, duke of Dorset, in the reign of Edgar, was the first founder. Gough, in his additions to Camden, only accounts for the discrepancy, by stating that it was considerably enlarged and increased in its endowments by Egelward. It became an abbey of Benedictine monks, dedicated at first to the blessed Virgin and the apostles Peter and Paul, but afterwards to St. Edburga. Belonging to the abbey was a large church, called the Holy Cross, 280 feet in length, and 120 broad. Of the abbey itself there are but few vestiges; but the church has been repaired, and used for parochial purposes. It has a lofty square tower, and contains several old monuments. In ancient times, the principal approach to the abbey was through Lice Street, a Saxon appellation derived from the corpses for interment being carried along that street. A small part of the gateway on the north side is still in existence; near it was the chapel of St. Edburga, a daughter of king Edward the Elder. Pershore has at present two churches, that of Holy Cross above-mentioned, and All Saints, which is small, but neat, and has a square tower. The town consists principally of one street, about three-quarters of a mile in length, and has many respectable houses. The manufacture of stockings is the chief pursuit of the inhabitants. It formerly sent members to parliament, but none have been returned since the 23d of Edward I. It has a market on Tuesday, and three annual fairs.

PERSIA, a most ancient and celebrated empire of Asia, the limits of which have been variously stated. At present, according to Sir William Jones, Persia is the name of only one province of this extensive empire, which, by the natives, and all the learned Mussulmans in India, is called Iràn. The same learned writer is confident that Iràn, or Persia in its largest extent, formerly comprehended within its outline the lower Asia.

OF ANCIENT PERSIA.—The most ancient name of this country was Elam, or Ælam, from Elam the son of Shem, from whom its first inhabitants are descended. Herodotus calls its inhabitants Cephenes; and in very ancient times the people are said to have called themselves Artæi, and the country where they dwelt Artæa. In the books of Daniel, Esdras, &c., it is called by the names of Pars, Pharas, or Fars, whence the modern name of Persia: but whence those

names have been derived is now uncertain. That Persia was originally peopled by Elam, the son of Shem, has been very generally admitted; but the ancient history of this distinguished empire is very little known. The first Persian monarch of whom any thing is known with tolerable accuracy was the great Cyrus, although it is evident that a powerful monarchy had subsisted in Iràn for ages before the accession of that hero; that this monarchy was called the Mahébédian dynasty; and that it was in fact the oldest monarchy in the world.

Cyrus is celebrated both by sacred and profane historians; but the latter are at no small variance concerning his birth and accession to the throne. The stories told by Herodotus of Astyages, the last king of the Medes, being alarmed by his dreams; of his endeavouring to prevent their fulfilment by marrying his daughter, Mandane, to a mean Persian; of his afterwards ordering his grandson Cyrus to be murdered; of his preservation by Harpagus, and of Astyages's barbarous revenge by murdering Harpagus's son, and serving up his mangled limbs to Harpagus at a dinner; and of Harpagus's conspiring with Cyrus to dethrone his grandfather; with Astyages's deposition and imprisonment; have all very much the air of a fable. According to Xenophon, Cyrus was the son of Cambyses, king of Persia, and Mandane the daughter of Astyages king of Media. He was born a year after his uncle Cyaxares, the brother of Mandane. He lived till the age of twelve with his parents in Persia, being educated after the manner of the country, and inured to fatigues and military exercises. At this age he was taken to the court of Astyages, where he resided four years, when the revolt of the Medes and Persians from the Babylonians happened. See Babylonia. While Cyrus was employed in the Babylonish war, before he attacked the metropolis itself, he reduced all the nations of Asia Minor. The most formidable of these were the Lydians, whose king Crœsus assembled a very numerous army, composed of all the other nations in that part of Asia, as well as of Egyptians, Greeks, and Thracians. This vast army, consisting of 420,000 men, Cyrus routed at the battle of Thymbra, and next day took Sardis, the capital of Lydia. See Crœsus, and Lydia. After the conquest of Sardis, Cyrus turned his arms against Babylon, which he reduced, as related under Babylonia. Having settled the civil government of the conquered kingdoms, and restored the Jews to their own land, Cyrus took a review of all his forces, which he found to consist of 600,000 foot, 120,000 horse, and 2000 chariots armed with scythes. With these he extended his dominion all over the nations to the confines of Ethiopia, and to the Red Sea; after which he continued to reign peaceably over his vast empire till his death, which happened about A. A. C. 529. In the time of Cyrus the Persian empire extended from the Indus to the Ægean Sea. On the north it was bounded by the Euxine and Caspian Seas, and on the south by Ethiopia and Arabia. That monarch kept his residence for the seven cold months at Babylon, by reason of the warmth of that climate; three months in the spring he spent at Susa, and two at Ecbatana during the heat of summer.

On his death-bed Cyrus appointed his son Cambyses to succeed him in the empire; and to his other son Smerdis he gave several considerable governments. The new monarch immediately set about the conquest of Egypt, which he accomplished in the manner related in the history of that country. Having reduced Egypt, Cambyses next resolved to turn his arms against the Carthaginians, Hammonians, and Ethiopians. But he was obliged to drop the first of these enterprises for want of ships: and in attempting to cross the Desert against the latter he lost the greater part of an immense army, and was obliged to return to Thebes. Through jealousy of his brother Smerdis he had caused him to be murdered, but, during his absence on this expedition, a magian, who greatly resembled Smerdis in looks, assumed the name of the deceased prince, and raised a rebellion against Cambyses, who was generally hated for his cruelty. Hastening home to suppress this revolt, his sword accidentally wounded him in the thigh, which occasioned his death.

Though he had on his death-bed informed the nobles of the murder of his brother, and that the person who had usurped the government was an impostor, yet they gave no credit to his assurances: Smerdis the magian was allowed to take possession of the throne in peace, and commenced his reign very popularly. The imposition was, however, soon detected, the false Smerdis having formerly lost his ears; the person who had killed the true Smerdis publicly confessed his crime; a confederacy of seven principal lords was formed against the usurper, and he and his brother Patizithes were slain, after a reign of only eight months. Nor were they the only sufferers. The mob fell upon the magi, and made a general massacre of them; the memory of which was kept up long after by an anniversary festival, called Magophonia. Six of the most noble conspirators having determined to choose a king from among themselves, by repairing on horseback to a particular spot, and bestowing the crown on him whose horse first neighed, Darius, the son of Hystaspes, governor of Susa, was put in possession of this dignity by the sagacity of his groom. He was elected king of Persia in the year 522 B. C. Immediately after his accession he promoted the other six conspirators to the first employments in the kingdom, married the two daughters of Cyrus, Atossa and Artystona, Parmys the daughter of the true Smerdis, and Phedyma the daughter of Otanes, who had detected the imposture of the magi. He then divided the whole empire into twenty satrapies or governments, and appointed a governor over each division, ordering them to pay him an annual tribute. Under Darius the building of the temple of Jerusalem, which had been obstructed by Cambyses and Smerdis, went on successfully, and the Jewish state was entirely restored. The most remarkable of Darius's other transactions were his expeditions against Babylon; against Scythia, India, and Greece. The expedition against Babylon took place A. A. C. 517. The inhabitants of that city, having laid

up a stock of provisions for several years, and strangled all the old people and children, and those whom they considered unnecessary, shut themselves up, and withstood the siege of Darius and all his forces for a year and eight months, and would most probably have succeeded in tiring them out; but Zopyrus, one of Darius's generals, having cut off his own nose and ears, persuaded them he had been thus barbarously treated by the monarch, and was desirous of revenge; so they intrusted to him the guard of the city, which he delivered up to the Persians. Darius beat down the walls of that metropolis to the height of fifty cubits; 3000 of the most active in the rebellion were impaled; the rest pardoned. After the reduction of Babylon Darius undertook a Scythian expedition, directed against those nations which lie between the Danube and the Tanais. In this, however, he was not so fortunate. He led 700,000 men into Scythia, but the inhabitants, too wise to oppose so vast an army in the field, retreated before him, wasting the country as they fled. Seeing the imminent danger his army were in of perishing for want, he began his retreat, which he effected with the loss of the old and sick, whom he left behind him. India, however, felt and submitted to his prowess. He reduced that large country, and made it a province of the Persian empire, drawing from thence an annual tribute of 360 talents of gold. He also undertook an unfortunate expedition into Greece. The ill success which attended him here, however, was so far from making him drop the enterprise that it only made him the more intent on reducing the Grecians; and he resolved to head his army in person, having attributed his former bad success to the inexperience of his generals. But, while he was making the necessary preparations for this purpose, he received intelligence that the Egyptians had revolted, so that he was obliged to make preparations for reducing them also; and before this could be done the king died, after having reigned thirty-six years, leaving the throne to his son Xerxes.

This prince ascended the throne of Persia in the year 485 B. C.; and his first enterprise was to reduce the Egyptians, which he effectually did, bringing them into a worse state of slavery than they ever had experienced. After this he also resolved on an expedition into Greece; the unfortunate event of which made him at last so dispirited that he henceforth abandoned all thoughts of war and conquests; but growing tyrannical, and oppressing his subjects, he was murdered in his bed, A. A. C. 464, and twenty-first of his reign; and was succeeded by his third son Artaxerxes, surnamed Longimanus on account of the great length of his arms. This prince is named Ahasuerus in Scripture, and is the same who married Esther, and during the whole of his reign showed the greatest kindness to the Jewish nation. In the beginning of his reign he was opposed by Hystaspes the second son of Xerxes, whom, however, he overcame, though not without considerable difficulty. After this he settled the affairs of government, and reformed many abuses which had crept in; and then, being fully established on the throne, he appointed feasts and rejoicings to be made for 180 days in the city of Susa; at one of which he resolved to divorce his queen for disobedience; and afterwards married the Jewess Esther, as recorded Est. ii. 1—18. In the fifth year of his reign the Egyptians revolted anew, and, being assisted by the Athenians, held out for six years; but were again obliged to submit, and continued in subjection during the whole of his reign. Nothing else remarkable happened during the life of Artaxerxes Longimanus, who died in the forty-first year of his reign; and was succeeded by Xerxes II., the only son he had by his queen, though by his concubines he had seventeen.

Xerxes II., having drunk immoderately at an entertainment immediately after his accession, retired to a chamber to refresh himself with sleep; but here he was murdered by Sogdianus, the son of Artaxerxes by one of his concubines, after he had reigned forty-five days. Sogdianus was scarcely seated on the throne when he put to death Bagorazus, the most faithful of all his father's eunuchs; by which, and the murder of his sovereign, he became generally odious. He next sent for his brother Ochus, intending to murder him; but the latter, having collected a great army under pretence of avenging the death of Xerxes, and being joined by many of the nobles and governors of provinces, Sogdianus proposed an accommodation. Ochus, however, no sooner had him in his power than he caused him to be suffocated among ashes. Being settled on the throne, Ochus changed his name to Darius; and is by historians commonly called Darius Nothus, or The Bastard. But Arsites, another of the brothers, seeing how Sogdianus had got the better of Xerxes, and Ochus of him, revolted. He was not, however, successful; for being defeated in an engagement he surrendered, and was immediately put to death by suffocation. Several other persons were executed: but these severities did not procure Ochus repose; for his whole reign was disturbed with violent commotions. One of the most dangerous was raised by Pisuthnes governor of Lydia; but he, being deserted by his Greek mercenaries, was overcome, and put to death. His son Amorgas continued to infest the maritime provinces of Asia Minor for two years; till he also was taken and put to death by Tissaphernes, governor of Lydia. Other insurrections quickly followed; particularly that of the Egyptians, who could not be reduced. Before his death Darius invested Cyrus his youngest son with the supreme government of all Asia Minor. This was done through the persuasion of his mother Parysatis, who had an absolute sway over her husband; and she procured this command for him, that he might thereby be enabled to contend for the kingdom after his father's death. He died A. A. C. 405, and was succeeded by his son Artaxerxes, by the Greeks surnamed Mnemon, on account of his extraordinary memory.

The most remarkable transaction during the reign of this prince was the revolt of his brother Cyrus. He began with gaining over the cities under Tissaphernes; which quickly produced a war with that governor. Cyrus then began to assemble troops, which he pretended were de-

signed only agai[redacted]nes. As he had given great assistance to the Spartans in their wars against the Athenians, he now demanded assistance from them; which they very readily granted. Cyrus, having thus collected an army of 13,000 Greek mercenaries and 100,000 regular troops of other nations, set out from Sardis, towards Upper Asia. Having arrived at Cunaxa, in Babylon, Cyrus found his brother with 900,000 men ready to engage him. Clearchus, the commander of the Peloponnesian troops, advised Cyrus not to charge in person, but to remain in the rear of the Greek battalions; but he replied that he should thus render himself unworthy of the crown for which he was fighting. As the king's army drew near, the Greeks fell upon them with such fury that they routed the wing opposite to them almost at the first onset; upon which Cyrus was with loud shouts proclaimed king by those next to him. But he, perceiving that Artaxerxes was wheeling about to attack him in flank, advanced against him with 600 chosen horse, killed Artageses, captain of the king's guards, with his own hand, and put the whole body to flight. In this encounter, discovering his brother, he spurred on his horse, and, coming up to him, engaged him with great fury. Cyrus killed his brother's horse, and wounded him on the ground; but he immediately mounted another, when Cyrus attacked him again, and gave him a second wound; until the guards, perceiving the king's danger, discharged their arrows against Cyrus, who at the same time was pierced through by his brother's javelin. He fell dead upon the spot; and all the chief lords of his court were slain with him. In the mean time, the Greeks having defeated the enemy's left wing, commanded by Tissaphernes, and the king's right wing having put to flight Cyrus's left, both parties imagined that they had gained the victory. But Tissaphernes acquainting the king that his men had been put to flight by the Greeks, he immediately rallied his troops. The Greeks under Clearchus easily repulsed them, and pursued them to the foot of the neighbouring hills. As night was drawing near, they returned to their camp, but found that the greatest part of their baggage had been plundered, and all their provisions taken. The next morning they received the news of Cyrus's death, and the defeat of the army under him. Whereupon they sent deputies to Ariæus, commander in chief of all the other forces of Cyrus, offering him the crown of Persia. Ariæus rejected the offer, and, acquainting them that he intended to set out on his return to Ionia, advised them to join him in the night. They followed his directions, and, under Clearchus, arrived at his camp about midnight, whence they set out on their return to Greece. They were at a vast distance from their own country, in the very heart of the Persian empire, surrounded by a victorious and numerous army, and had no way to return again, but by forcing their way through an immense track of the enemy's country. But their valor and resolution mastered all these difficulties; and in spite of a powerful army, which pursued and harassed them all the way, they made good their retreat for 2325 miles through the provinces belonging to the enemy, and got safe to the Greek cities on the Euxine Sea. This retreat, the longest that ever was made through an enemy's country, was conducted at first by Clearchus; but he being cut off, through the treachery of Tissaphernes, Xenophon was chosen in his room. See XENOPHON. The war with Cyrus was scarcely ended, when another broke out with the Spartans, on the following account:—Tissaphernes being appointed to succeed Cyrus in all his power, to which was added all which he himself possessed formerly, began to oppress the Greek cities in Asia in a most cruel manner. On this they sent ambassadors to Sparta, desiring assistance. The Spartans, having ended their long war with the Athenians, willingly laid hold of this opportunity of breaking with the Persians, and therefore sent against them an army under the command of Thimbro, who, being strengthened by the forces which returned under Xenophon, took the field against Tissaphernes. But, Thimbro being recalled, Dercyllidas, a brave officer, was appointed to succeed him; and he carried on the war to much more advantage. Finding that Tissaphernes was at variance with another governor named Pharnabazus, he concluded a truce with the former, and, marching against Pharnabazus, drove him quite out of Æolis, and took several cities in other parts. The latter repaired to the Persian court, complained against Tissaphernes, and advised the king to equip a powerful fleet, and give the command of it to Conon the Athenian, by which he would obstruct the passage of further recruits from Greece; and thus soon put an end to the power of the Spartans in Asia. The king accordingly ordered 500 talents for the equipment of a fleet, and appointed Conon commander of it. The Spartans, hearing of this, sent over Agesilaus, one of their kings, and a most experienced commander, into Asia. This was done with such secrecy that Agesilaus arrived at Ephesus before the Persians had the least notice of his designs. He took the field with 10,000 foot and 4000 horse, and, falling upon the enemy while totally unprepared, carried every thing before him. Tissaphernes deceived him into a truce till he got his troops assembled, but gained little by his treachery; for Agesilaus deceived him in his turn, and, while Tissaphernes marched his troops into Caria, the Greeks invaded and plundered Phrygia. After various deceptive manœuvres on each side, Agesilaus led his troops against Sardis; and Tissaphernes having despatched a body of horse to its relief, Agesilaus fell upon them before the foot could come to their assistance. The Persians were routed at the first onset; after which Agesilaus over-ran the whole country, enriching his army with the spoils. By this continued ill fortune Artaxerxes was so much provoked against Tissaphernes that he caused him to be put to death. Tithraustus, who was appointed to succeed him, sent large presents to Agesilaus, to bribe him to abandon his conquests; but, finding him determined not to relinquish the war, he sent Timocrates of Rhodes into Greece, with money to bribe the leading men in the cities, and rekindle a war against the Spartans. Accordingly the cities of Thebes, Argos, Corinth, &c., entering into a confederacy,

obliged them to recall Agesilaus to defend Sparta. After his departure, which happened A. A. C. 354, the Spartan power received a severe blow at Cnidos, where their fleet was entirely defeated by that of Artaxerxes under Conon, fifty of their ships being taken in the engagement; after which Conon and Pharnabazus, being masters of the sea, sailed round the islands and coasts of Asia, taking the cities there which had been reduced by the Spartans. Sestos and Abydos only held out, and resisted the utmost efforts of the enemy, though they had been besieged both by sea and land. Next year Conon, having assembled a powerful fleet, again took Pharnabazus on board, and reduced the island of Melos, whence he made a descent on the coasts of Lycaonia, pillaging all the maritime provinces, and loading his fleet with an immense booty. After this Conon obtained leave to return to Athens, with eighty ships and fifty talents, to rebuild the walls of that city. Having a great number of hands, the work was soon completed, and the city not only restored to its former splendor, but rendered more formidable than ever. The Spartans were soon reduced to the necessity of making peace. The terms were, that all the Greek cities in Asia should be subject to the king of Persia, also the islands of Cyprus and Clazomena; that Scyros, Lemnos, and Imbros, should be restored to the Athenians, and all the cities of Greece declared free.

Artaxerxes engaged to join those who accepted these terms, and to assist them against such as should reject them. Being now disengaged from the Grecian war, he turned his arms against Evagoras, king of Cyprus, who was descended from the ancient kings of Salamine, the capital of Cyprus. His ancestors had reigned there for many ages, but were at last driven out by the Persians, who reduced the island to a Persian province. Evagoras, however, being a man of an enterprising genius, drove out the Persian governor. Artaxerxes therefore attempted to expel him; but Conon, by means of Ctesias, chief physician to Artaxerxes, got all differences accommodated. Evagoras then gradually reduced under his subjection almost the whole of the island. Some towns, however, held out, and applied to Artaxerxes for assistance; who, as soon as the war was at an end, bent all his force against Evagoras. The Athenians, notwithstanding the favors conferred upon them by Artaxerxes, could not forbear assisting their old ally in his emergency, and sent ten men of war under Philocrates; but the fleet commanded by Talentias, brother to Agesilaus, falling in with them near Rhodes, surrounded them so that not one ship escaped. The Athenians sent Chabrias with another fleet and body of land forces, with which he quickly reduced the whole island. But the Athenians being soon after obliged, by a treaty concluded with the Persians, to recall Chabrias, Artaxerxes attacked the island with 300,000 men and 300 ships. Evagoras applied to the Egyptians, Lybians, Arabians, Tyrians, and other nations, from whom he received supplies both of men and money; and fitted out a fleet, with which he ventured an engagement with that of Artaxerxes. But being defeated, and obliged to shut himself [illegible], he was closely besieged, and at last was obliged to capitulate, and give up the whole island except Salamine, which he held as a king tributary to Artaxerxes. The Cyprian war being ended, Artaxerxes turned his arms against the Cadusians, whose country lay between the Euxine and Caspian Seas, but was obliged to abandon the project, after having lost a great number of troops, and all his horses. In his Egyptian expedition, which happened immediately after the Cadusian war, he was attended with little better success, owing to the bad conduct of Pharnabazus. This commander sent an ambassador to Athens, demanding Iphicrates, the best general of his time, to command the Greek mercenaries in the Persian service. This the Athenians complied with; and Iphicrates having mustered his troops, so exercised them in all the arts of war, that they became famous among the Greeks under the name of Iphicratesian soldiers. But the Persians were so slow in their preparations that two whole years elapsed before they were ready to take the field. Artaxerxes, that he might draw the more mercenaries out of Greece, sent ambassadors to the different states in it, enjoining them to live at peace with each other, on the terms of the treaty lately concluded. The troops were mustered at the city then called Ace, and since called Ptolemais; where they amounted to 200,000 Persians under Pharnabazus, and 20,000 Greeks led by Iphicrates. The fleet consisted of 300 galleys, besides a vast number of other vessels which followed with provisions. The fleet and army began to move at the same time; and separated as little as possible. Having made a descent at one of the mouths of the Nile, they took a fortress, and put all the Egyptians in it to the sword. Iphicrates then proposed embarking the troops without loss of time, and attacking Memphis, the capital, which would have rendered it easy to reduce the whole country; but Pharnabazus would undertake nothing before the rest of the forces were come up: neither would he permit Iphicrates to attack the place with the Greek mercenaries only, from a mean jealousy of the honor which he might acquire; and thus the Egyptians recovered courage to put themselves in such a posture of defence that they could not be attacked with any probability of success; and the Nile, overflowing its banks, obliged them to return to Phœnice. The expedition was again undertaken twelve years after, but without success. The last years of Artaxerxes were greatly disturbed by dissensions in his family; and he died in the ninety-fourth year of his age, and forty-sixth of his reign.

He was succeeded by one of his sons named Artaxerxes Ochus, who behaved with such cruelty that almost one half of his dominions revolted as soon as he came to the throne. But, by the dissensions of the rebels among themselves, all of them were reduced one after another; and the Sidonians, finding themselves betrayed, burnt themselves, to the number of 40,000, together with their wives and children. Artaxerxes Ochus, having quelled all the insurgents, immediately set himself about reducing Egypt, and for this purpose procured a reinforcement of other 10,000 mercenaries from Greece. On this march he lost

a great number o[illegible]he lake Serbonis. When the south wind blows this lake is said to have been covered with sand in such a manner that no one could distinguish it from the firm land. Several parties of Ochus's army were lost in it for want of proper guides; and whole armies have sometimes perished in it. When he arrived in Egypt he detached three bodies to invade the country, each commanded by a Persian and a Greek. The first was led by Lachares the Theban, and Rosaces governor of Lydia and Ionia; The second by Nicostratus the Theban and Aristazanes; the third by Mentor the Rhodian and Bagoas an eunuch. The main body of the army he kept with himself, and encamped near Pelusium, to watch the events of the war. The event was successful, and Ochus, having reduced the whole country, dismantled their strong holds, plundered the temples, and returned to Babylon loaded with booty; where he conferred high rewards on those who had distinguished themselves. To Mentor the Rhodian he gave 100 talents, and other presents; appointed him governor of all the coasts of Asia, and committed to his care the whole management of the war which he was still carrying on, and, either by stratagem or by force, he at last reduced all the provinces that had revolted. Ochus then gave his attention to nothing but his pleasures, leaving the administration of affairs entirely to Bagoas the eunuch, and to Mentor. These two agreeing to share the power between them, the former had Upper Asia, and the latter all the rest. Bagoas, being an Egyptian, had a great zeal for the religion of his country, and endeavoured, on the conquest of Egypt, to influence the king in favor of the Egyptian ceremonies; but Ochus not only refused to comply, but killed the sacred bull, the emblem of Apis, plundered the temples, and carried away their sacred records. Bagoas in revenge poisoned his master and benefactor in the twenty-first year of his reign; kept the king's body, causing another to be buried in its stead; and, because the king had caused his attendants to eat the flesh of Apis, Bagoas cut his body in pieces, and gave it so mangled to be devoured by cats, making handles for swords of his bones. He then placed Arses the youngest of the deceased king's sons on the throne, that he might the more easily preserve the whole power to himself.

Arses did not long enjoy even the shadow of power which Bagoas allowed him, being murdered in the second year of his reign by that treacherous eunuch, who now conferred the crown on Darius Codomanus, a relation of the royal family. But, finding that he would not suffer himself to be guided by him in all things, Bagoas brought him also a poisonous potion; when Darius practised upon him his own artifice, causing him to drink the poison which he brought. This established Darius in the throne as far as security from internal enemies could do so; but in a very little time his dominions were invaded, and soon conquered, by Alexander the Great. The particulars of that hero's conquests are related under MACEDON: we shall therefore here only take notice of the fate of Darius himself, with which the Persian empire concluded for many ages. After the battle of Arbela, Alexander took and plundered Persepolis, whence he marched into Media, in pursuit of Darius, who had fled to Ecbatana the capital. This prince had still an army of 30,000 foot, among whom were 4000 Greeks, who continued faithful to the last. Besides these he had 4000 slingers and 3000 horse, most of them Bactrians, commanded by Bessus. When Darius heard that Alexander had marched to Ecbatana, he retired into Bactria, with a design to raise another army; but soon after he determined to venture a battle with the forces he still had left. On this Bessus, governor of Bactria, and Nabarzanes, a Persian lord, formed a conspiracy to seize his person, and, if Alexander pursued them, to gain his friendship by betraying their master into his hands; but if they escaped, their design was to murder him, and usurp the crown. The troops were easily gained over; but Darius himself, when informed of their proceedings, and solicited to trust his person among the Greeks, could not give credit to the report. The consequence was that he was in a few days seized by the traitors; who bound him with golden chains, and, shutting him up in a covered cart, fled with him towards Bactria. The cart was covered with skins, and strangers appointed to drive it without knowing who the prisoner was. Bessus was proclaimed commander and chief by the Bactrian horse; but Artabazus and his sons, with the forces they commanded, and the Greeks, under one patron, retired from the army under Bessus, and marched over the mountains towards Parthiene. Alexander, arriving at Ecbatana, was told that Darius had left the place five days before. He then despatched orders to Clitus, who had fallen sick at Susa, to repair, as soon as he recovered, to Ecbatana, and thence to follow him into Parthia with the cavalry and 6000 Macedonians, who were left in Ecbatana. Alexander himself, with the rest of the army, pursued Darius; and the eleventh day arrived at Rhages, having marched in that time 3300 furlongs. Most of those who accompanied him died through fatigue; insomuch that, on his arrival at Rhages, he could scarcely muster sixty horsemen. Finding that he could not come up with Darius, who had passed the Caspian straits, he staid five days at Rhages, to refresh his army, and settle the affairs of Media. Thence he marched into Parthia, and encamped near the Caspian straits, which he passed next day without opposition. He had scarcely entered Parthia, when he was informed that Bessus and Nabarzanes had conspired against Darius, and designed to seize him. Hereupon, leaving the main body of the army with Craterus, he advanced with a small troop of horse, and, having marched day and night, he came on the third day to a village where Bessus with his Bactrians had encamped the day before. At this place he learnt that Darius had been seized by the traitors; that Bessus had caused him to be shut up in a close cart, and that the whole army, except Artabazus and the Greeks, obeyed Bessus. At last Alexander came in sight of the barbarians, who were marching in great confusion. His unexpected appearance struck them, though far

superior in number, with such terror, that they immediately fled; and, because Darius refused to follow them, Bessus, and those who were about him, discharged their darts at the unfortunate prince, leaving him wallowing in his blood. After this they all fled different ways, and were pursued by the Macedonians with great slaughter. In the mean time the horses that drew the cart in which Darius was, stopped; for the drivers had been killed by Bessus, near a village about four furlongs from the highway; and Polystratus, a Macedonian, being pressed with thirst, was directed by the inhabitants to a fountain near the place. As he was filling his helmet with water, he heard the groans of a dying man; and, looking round him, discovered a cart with a team of wounded horses, unable to move. Approaching it, he perceived Darius lying in the cart, having several darts in his body. He had enough of strength however, left to call for some water, which Polystratus brought him; and after drinking, turned to the Macedonian, and with a faint voice told him, that, in the deplorable state to which he was reduced, it was no small comfort to him that his last words would not be lost: he then charged him to return his hearty thanks to Alexander for the kindness he had shown to his wife and family, and to acquaint him, that, with his last breath, he besought the gods to prosper him, and make him sole monarch of the world. He added, that it did not so much concern him as Alexander to pursue and bring to condign punishment those traitors who had treated their lawful sovereign with such cruelty. Then taking Polystratus by the hand, 'Give Alexander your hand,' says he, 'as I give you mine, and carry him, in my name, the only pledge I am able to give, in this condition, of my gratitude and affection.' Having uttered these words, he expired in the arms of Polystratus. Alexander coming up, a few minutes after, bewailed his death, and caused his body to be interred with the highest honors. The traitor Bessus, being at last reduced to extreme difficulties, was delivered up by his own men, naked and bound, into the hands of the Macedonians; on which Alexander gave him to Oxyathres the brother of Darius, to suffer what punishment he should think proper. Plutarch tells us that he was executed in the following manner:—Several trees being by main force bent down to the ground, and one of the traitor's limbs tied to each of them, the trees, as they were suffered to return to their natural position, flew back with such violence that each carried with it a limb. Thus ended the ancient empire of Persia, 209 years after it had been founded by Cyrus.

After the death of Alexander, the Persian dominions became subject to Seleucus Nicator, and his successors, for sixty-two years, when the Parthians revolted, and conquered the greatest part of them. To the Parthians they continued subject for 475 years, when the sovereignty was again restored to the Persians, as related under PARTHIA. The restorer of the Persian monarchy was Artaxerxes, or Artaxares, who was not only a private person, but of spurious birth. However, he possessed great talents, and took the pompous title of king of kings. He gave notice to the Roman go[illegible] provinces bordering on his domin[illegible] had a just right, as the successor of Cyrus, to all the Lesser Asia; which he commanded them immediately to quit, as well as those on the frontiers of the ancient Parthian kingdom. The consequence of this was a war with Alexander Severus, the Roman emperor. Of the event of this war there are very different accounts. It is certain, however, that on account of his exploits against Artaxares, Severus took the titles of Parthicus and Persicus; though, it would seem with no great reason, as the Persian monarch lost none of his dominions, and his successors were equally ready with himself to invade the Roman territory.

Artaxares dying, after a reign of twelve or fifteen years, was succeeded by his son Sapor, a prince also of great abilities, but fierce, haughty, and untractable. He was no sooner seated on the throne than he began a new war with the Romans, in which at the beginning he was unsuccessful, being obliged by Gordian to withdraw from the Roman dominions, and even invaded in his turn; but, in a short time, Gordian being murdered by Philip, the new emperor made peace with him upon terms very advantageous to the Persians. Sapor now renewed his incursions, and made such alarming progress that the emperor Valerian, at the age of seventy, marched against him in person with a numerous army. An engagement ensued, in which the imperial troops were defeated, and Valerian taken prisoner. Sapor pursued his advantages with such cruelty that the people of the provinces took arms, first under Callistus, a Roman general, and then under Odenatus, prince of Palmyrene. The result was that they not only protected themselves from the insults of the Persians, but even gained many victories over them, and drove Sapor with disgrace into his own territory. In his march he is said to have made use of the bodies of his unfortunate prisoners to fill up the hollow roads, and to facilitate the passage of his carriages over several rivers. On his return to Persia, he was solicited, but in vain, by several neighbouring princes, to set Valerian at liberty. On the contrary he treated him daily with studied indignities; set his foot upon his neck when he mounted his horse, and finally, after some years confinement, flayed him alive; and caused his skin to be tanned, and preserved as a trophy of his victory over the Romans. This extreme insolence and cruelty was followed by an uninterrupted course of misfortune. Odenatus defeated him in every engagement, and even seemed ready to overthrow his empire: after him Aurelian took ample vengeance for the captivity of Valerian. Sapor died A. D. 273, after having reigned thirty-one years: and was succeeded by his son Hormisdas, and he by Varanes I. The former reigned a year and ten days, and the latter three years; after which he left the crown to Varanes II., who seems to have been so much awed by the Roman power that he durst undertake nothing. The rest of the Persian history, to the overthrow of the empire by the Saracens, affords nothing but an account of their continued invasions of the empire, which more properly belongs to the history of ROME and CONSTANTINOPLE,

and to which w[illegible]he last of the Persian monarchs, [illegible] the line of Artaxares, was Isdigertes, or Iezdegerd, who was contemporary with Omar, the second caliph after Mahomet. He was scarcely seated on the throne when he found himself attacked by a powerful army of Saracens under the command of one Sad, who invaded the country through Chaldea. The Persian general made every effort to harass the Arabs on their march; and, having an army superior to them in numbers, employed them continually in skirmishes: but Sad, perceiving that this lingering war would destroy his army, determined to force the enemy to a general engagement; which he at last accomplished with complete success, after a battle that lasted three days and three nights. Thus the capital, and the greatest part of the dominions of Persia, fell into the hands of the Arabs; along with the king's treasures, which were immense; A. D. 643.

After this battle Jezdegerd retired into Chorassan, where he reigned as king, over it and the two provinces of Kerman and Segestan. But, after about nineteen years, the governor of Merou betrayed it to the Turks. Jezdegerd immediately marched against the rebels and their allies, but was defeated; and, having with much difficulty reached the river, while he was bargaining with the ferryman about his fare, a party of the rebel horse came up, and killed him. This was in 652. Jezdegerd left behind him a son named Firouz, and a daughter, Dara. The latter espoused Bostenay, whom the rabbinical writers entitle the head of the captivity; and who, in fact, was the prince of the Jews settled in Chaldea. As for Firouz, he still preserved a little principality; and, when he died, left a daughter named Mah Afrid, who married Walid, the son of the caliph Abdalmalek, by whom she had a son named Yezid, who became caliph, and sovereign of Persia; and who, claiming the title derived from his mother, constantly styled himself the son of Khosrou, king of Persia, the descendant of caliph Maroan, and among whose ancestors on the side of the mother were the Roman emperor and the khacan. Persia continued to be subject to the Arabs till the decline of the Saracen empire; being governed by deputies, entitled sultans, under the grand khalifs. But in process of time the sultans of Persia, Babylon, &c., quarrelled among themselves, and occasioned several revolutions, and fluctuations of power, the consequence of which was the coming in of the Turks. Tangrolopix, their leader, conquered the sultan of Persia in 1030, and assumed the government. He was succeeded by a race of Turkish princes for about 100 years, when the Tartars invaded Persia, drove out the Turks, and a new dynasty of Tartarian princes succeeded: after which it was seized by various usurpers, till the time of Jenghiz Khan, who conquered it, with almost all the rest of Asia.

After the death of Jenghiz Khan, which happened in 1227, Persia and the neighbouring countries were governed by officers appointed by his successors, who reigned at Kerakorom, in the eastern parts of Tartary, till 1253, when it became once more the seat of a considerable empire under Haalen, or Hulaku the Mogul, who, in 1256, abolished the khalifat, by taking Bagdad After the death of Hulaku his son Abaka succeeded to his extensive dominions; who, in the very beginning of his reign, was invaded by Barkan Khan, of the race of Jagatay, the son of Jenghiz Khan, from Great Bukharia, with an army of 300,000 men; but, happily for Abaka, Barkan died before the armies came to an engagement, upon which the invaders returned to Tartary. In 1264 Armenia and Anatolia were ravaged by the Mamelukes from Egypt, but they were obliged to fly from Abaka; who thus seemed to be established in an empire almost as extensive as that of the ancient Persian kings. But in 1268 his dominions were invaded by Borak Khan, another descendant of Jagatay, with an army of 100,000 men. He quickly reduced the province of Chorassan, and in 1269 advanced as far as Aderbijan, where Abaka had the bulk of his forces. A bloody battle ensued, in which Abaka was victorious, and Borak obliged to fly into Tartary, with the loss of all his baggage, and great part of his army. Abaka died in 1282, after a glorious reign of seventeen years, and was succeeded by his brother Achmed Khan. He was the first of the family of Jenghiz Khan who embraced Mahometanism; but neither he nor his successors appear to have been much versed in the arts of government; for the Persian history, from this period, becomes only an account of insurrections, murders, and rebellions, till the year 1337; when, upon the death of Abusaid, it split to pieces, and was possessed by a great number of petty princes; all of whom were at perpetual war with each other till the time of Timur Beg, or Tamerlane, who once more, about A. D. 1400, reduced them under one jurisdiction.

After the death of Tamerlane Persia continued to be governed by his son Shah Rukh, or Mirza, a wise and valiant prince: but it did not remain in the family above six short reigns: after continual dissensions among themselves, the last of them was defeated and slain in 1472, by Usum Cassan, an Armenian prince. There were five princes of this line; after which the empire was held by a great number of petty tyrants, till the beginning of the sixteenth century, when it was conquered by Shah Ismael Safi, Sofi, or Sophi; whose father was Sheykh Hayder, the nineteenth in a direct line from Ali the son-in-law of Mahomet. When Tamerlane returned from the defeat of Bajazet, the Turkish sultan, he carried with him a great number of captives out of Karamania and Anatolia, intending to put them to death; and with this intent he entered Ardebil, a city of Arderbijan, twenty-five miles east of Taurus, where he continued for some days. At this time lived in that city the Sheykh Sesi, reputed by the inhabitants to be a saint; and as such was much reverenced by them. From the fame of his sanctity, Tamerlane paid him frequent visits; and, when he was about to depart, promised to grant whatever favor he should ask; Sesi requested that he would spare the lives of his captives. Tamerlane granted this request; upon which the Sheykh furnished them with clothes and other necessaries, and sent them home. The people were so much affected with this extraordinary instance of virtue that they

afterwards repaired in great numbers to Sesi, bringing with them considerable presents. Thus the descendants of the Sheykh made a conspicuous figure till 1486, when they were all destroyed by the Turks except Ismael, who fled to Ghilan; where he lived for some time under the protection of the king of that country. There was at that time a vast number of different sects of Mahometans dispersed over Asia; and, among these, a party who followed Hayder, the father of Ismael. Ismael, therefore, finding that Persia was in confusion, and hearing that there was a great number of the Hayderian sect in Karamania, removed thither, and collected 7000 of his party, by whose aid he conquered Shirwan. After this he pursued his conquests; and, as his antagonists never united to oppose him, had conquered the greatest part of Persia, and reduced the city of Bagdad in 1510. But in 1511 he received a great defeat from Selim I., who took Tauris, and would probably have crushed the new Persian empire in its infancy, had he not thought the conquest of Egypt more important.

Modern Persia.—Ismael died in 1523, leaving the crown to his eldest son Thamasp I., a man of very limited abilities, and who was invaded by the Turks on his accession to the throne. However, they were obliged to retreat by an inundation, which overflowed their camp. Thamasp then reduced Georgia to a province of the empire, which had previously been divided among a number of petty princes. The reigns of the succeeding princes afford nothing remarkable till the time of Shah Abbas I., surnamed the Great. He ascended the throne in 1584; and began with declaring war against the Tartars, who had seized the finest part of Chorassan. Having raised a powerful army, he entered that province, where he was met by Abdallah Khan, the chief of the Usbeck Tartars, whom he attacked and defeated. Here he continued three years; and, on leaving Chorassan, fixed the seat of government at Ispahan, where it has continued ever since. His next expedition was against the Turks, from whom he took the city of Tauris, after defeating the garrison; on which most of the other adjacent places submitted. One city only, called Orumi, being strongly situated, resisted all the efforts of Abbas; but was at last taken by the assistance of the Curds, whom he gained over by promising to share the plunder with them. Instead of this, however, he invited their chiefs to dine with him; and, having brought them to a tent, the entrance to which had several turnings, he stationed on the inside two executioners, who cut off the heads of the guests as soon as they entered. After this barbarous piece of treachery, Abbas considerably enlarged his dominions, and repelled two dangerous invasions of the Turks. He attempted also to promote commerce, and civilise his subjects; but stained all his great actions by abominable cruelties. He took the isle of Ormus from the Portuguese, who had kept it since 1507, by the assistance of some English ships in 1622; and died six years after, aged seventy.

The princes who succeeded Abbas were remarkable only for those cruelties and debaucheries [illegible] revolution in 1716, when Sh[illegible] dethroned by the Afghauns or Pattans; who, being oppressed by the ministers, revolted, under the conduct of one Mereweis. The princes of the Afghaun race enjoyed the sovereignty only sixteen years, when Ashraff, the reigning shah, was dethroned by one of his officers. On this Thamasp, otherwise called Thamas, the only survivor of the family of Abbas, assembling an army, invited into his service Nadir Khan, who had obtained great reputation for his valor and conduct. No sooner had Nadir got the command of the Persian army than he attacked and defeated the usurper Esriff, put him to death, and recovered all the places the Turks and Russians had taken during the rebellion, when prince Thamas seemed to be established on the throne: but Nadir, to whom Thamas had given the name of Thamas Kouli, that is, the Slave of Thamas, thinking his services not sufficiently rewarded, and pretending that the king had a design against his life, conspired against his sovereign, put him to death, and usurped the throne, styling himself Shah Nadir. He afterwards laid siege to Candahar, of which a son of Mereweis had possessed himself. While at this siege, the court of the Great Mogul being distracted with factions, one of the parties invited Shah Nadir to come to their assistance, and betrayed the Mogul into his hands. He thereupon marched to Delhi, the capital of India, summoning all the viceroys and governors of provinces to attend him, and bring with them all the treasures they could raise: those that did not bring as much as he expected he tortured and put to death. Having thus amassed an immense treasure, he returned to Persia, giving the Mogul his liberty on condition of his resigning the provinces on the west side of the Indus to Persia. He afterwards made a conquest of Usbeck Tartary, and plundered Bochara the capital. Then he marched against the Dagistan Tartars; but lost great part of his army in their mountains. He defeated the Turks in several engagements; but, laying siege to Bagdad, was twice compelled to raise it. He proceeded to change the religion of Persia to that of Omar, hanged up the chief priests, put his own son to death, and was guilty of such cruelty that he was at length assassinated by his own relations in 1747.

Upon the death of Shah Nadir a contest ensued among his relations for the crown, which rendered Persia a scene of the most horrible confusion for upwards of forty years. The reader will form some notion of the troubles of this unhappy country from the following series of pretenders to the throne, between the death of Nadir and the accession of Kerim Khan:—Their reigns, or more properly the length of time they respectively governed with their party, were as follows;—1. Adil Shah, nine months. 2. Ibrahim Shah, six months. 3. Shah Rokh Shah, after a variety of revolutions, at length regained the city of Meschid; he was alive in 1787, and above eighty years of age, reigning in Khorasan, under the direction of his son Nussir Ullah Meerza. 4. Suleeman Shah, and 5 Ismael Shah, in about forty days were both cut off, almost as soon as they were elevated. 6. Azad Khan

Afghan, one o[illegible]formidable rivals and com[illegible]dued by him, brought prisoner to Shirauz, and died there a natural death. 7. Hussun Khan Kejar, another of Kerim Khan's competitors, was besieging Shirauz, when his army suddenly mutinied and deserted him. The mutiny was attributed to their want of pay. A party sent by Kerim Khan took him prisoner; his head was instantly cut off, and presented to [illegible]rim Khan. His family were brought captives to Shirauz; they were well treated, and had their liberty given them soon after, under an obligation not to quit the city. 8. Ali Merdan Khan was killed by a musket-shot, as he was walking on the ramparts of Maschid encouraging his men. 9. Kerim Khan Zund, by birth a Curdistan, was a favorite officer of Nadir Shah, and at the time of his death was in the southern provinces. Shirauz and other places had declared for him. After various encounters, he completely subdued all his rivals, and finally established himself ruler of all Persia. He was in power about thirty years; the latter part of which he governed Persia under the appellation of vakeel or regent, for he never would take the title of shah. He made Shirauz the chief city of his residence, in gratitude for the assistance he had received from its inhabitants and those of the southern provinces. He died in 1779, regretted by all his subjects, who esteemed and honored him as the glory of Persia.

When the death of Kerim Khan was announced in that city much confusion arose; twenty-two principal officers of the army, men of high rank, took possession of the citadel, with a resolution to acknowledge Abul Futtah Khan (the eldest son of the late vakeel) as their sovereign, upon which Zikea Khan, a relation of the late vakeel by the mother's side, possessed of immense wealth, enlisted a great part of the army into his pay. Zikea Khan was of the tribe of Zund (or the Lackeries), a man remarkably proud, cruel, and unrelenting. Having assembled a large body of troops, he marched to the citadel, and laid close siege to it for three days; at the expiration of which, finding he could not take it by force, he had recourse to treachery. To each of the principal khans he sent a written paper, by which he swore upon the Koran, that if they would come out and submit to him, not a hair of their heads should be touched, and, they should have their effects secured to them. Upon this a consultation was held by them; and as they could not subsist many days longer, they agreed to surrender, relying on Zikea's promises. Zikea, in the mean time, gave private orders for the khans to be seized, and brought separately before him as they came out of the citadel. His orders were strictly obeyed, and these deluded men were all massacred in his presence. Zikea Khan's tyranny became soon intolerable, and he was cut off by his own body-guard, when Abul Futtah Khan, who was then in the camp, was proclaimed king by the unanimous voice of the troops, whom he immediately led back to Shirauz. On his arrival he was acknowledged as sovereign by all ranks of people, and took quiet possession of the government.

Mahomed Sadick Khan, only brother of the late Kerim Khan, who had during that prince's life filled the high office of beglerbeg of Fars, and had been appointed guardian of his son Abul Futtah Khan, was at this period governor of Bussora, which had been taken by the Persians, previous to the vakeel's death. Upon hearing of his brother's decease he began to form schemes for the destruction of his nephew; but, as it was necessary for him to be on the spot, he withdrew the Persian garrison from Bussora, who were all devoted to his interest; evacuated the place, and marched immediately for Shirauz. The news of Sadick Khan's approach threw the inhabitants of this city into the greatest consternation; some, from his public character, expected he would fulfil the commands of his deceased brother; others expected he would set up for himself, which proved to be the case; for, having entered Shirauz a very few days after, he caused Abul Futtah Khan to be deprived of sight, and put into close confinement. After this Sadick Khan openly assumed the government. As soon as the intelligence reached Ali Murad Khan, who was at Ispahan, he instantly rebelled; deeming himself to have an equal right to the government with Sadick Khan. Persia was thus again involved in all the horrors of a civil war. Ali Murad Khan indeed took possession of Shirauz, assumed the government, and gave to the empire the flattering prospect of being settled under the government of one man; but this prospect was soon obscured by the power and credit acquired by Akau Mahomed. On the night following Kerim Khan's death this man found means to make his escape from Shirauz, and fled to the northward, where, collecting some troops, he soon made himself master of Mazanderan and Ghilan, and was proclaimed nearly about the time that Ali Murad Khan had taken Shirauz. Ali Murad, hearing of his success, determined to go against him; but, as he was previously proceeding to Ispahan to suppress a rebellion, he fell suddenly from his horse and expired. At this period Jaafar Khan, the eldest and only surviving son of Sadick, was governor of Khums: he deemed this a favorable opportunity to assert his pretensions to the government, and immediately marched with what few troops he had to Ispahan; where, soon after his arrival, he was joined by the greater part of the malcontents who were then in arms. In this situation he remained some time; but, Akau Mahomed coming down upon him with his army, he was obliged to risk his fate in a battle, and, being defeated, fled to Shirauz. Soon after he ventured a second engagement with his opponent; and for this purpose marched with his army towards Ispahan; the two armies met near Yezdekhast, when a battle ensued; and, Akau Mahomed's superior fortune again prevailing, Jaafer was defeated, and retired to Shirauz, which he quitted on the 25th of June, 1787, and shortly after marched his army to th northward.

Akau, or Aga Mahomet's fortunes finally prevailed; and he transmitted the throne of Persia to his nephew, the present shah, Futtah Ali, who is described as an accomplished prince; his

eldest son is also said to be an able chieftain, and has distinguished himself in the late contests with Russia.

Modern Statistics of Persia.—On the empire once of this name the great modern encroachments have been those of the Afghauns on the east (see Afghaunistaun), the Turks on the west, or in [illegible] rivers Euphrates and Tigris, [illegible] Georgia. Various tribes have also rendered themselves independent in the great Caucasian chain. Mr. Kenneir, one of the ablest modern writers on the geography of Persia, includes the following provinces as forming its present dominion:—

Provinces.	Ancient Names.	Chief Towns.
Fars, or Fasistan	Persis, or Persia Proper	Shiraz.
Irak, or Irakadjemi	Media	Ispahan.
Lar, or Laristan		Lar.
Kuzistan	Susiana	Shuster.
Kurdistan (part of)	Assyria Proper	
Azerbijan		Tabreez.
Ghilan	Gela	Resht.
Mazanderan	Hyrcania (part of)	Sari.
Khorassan	Margiana and Aria	Meshed.
Kerman (western part)	Caramania	Kerman.

One of the most prominent geographical features of this empire is the grand Caucasian chain, which some writers consider as the root of all its ranges of mountains. It belongs, however, itself rather to the frontier than the interior, especially of late years, and since the success of the Russian arms in this quarter. Southwards from this chain spread the mountains of Armenia and Koordistan, which connect themselves with Mount Taurus; also frontier and debateable ground, i. e. between the Persian and Turkish empires. From the highest part of them, a great chain, under the name of Elwand or Elbruz, makes a circuit round the southern shore of the Caspian, leaving between itself and that sea a fertile plain. Mount Demavend, its loftiest peak, here rises to upwards of 10,000 feet; and near it is supposed to be that remarkable pass to which the ancients gave the name of the Caspian Gates, which for twenty-eight miles allowed only a narrow road between high rocks for a single chariot. The Elbruz is continued along the southern frontier of Khorassan, and, though there lost sight of, is thought to unite with the mountains of Parapomisus, and through them with the Hindoo Cooash and Himmaleh. Chains of inferior height traverse the provinces of Khusistan and Faristan, on the south.

Nearly the whole empire may be said to be traversed by a table land, composed of successive ranges of mountains, with narrow plains at their bases, some of which exceed 100 miles in length. The distinguishing feature perhaps is the great deserts which occupy all the widespread tracts. The most noted is that called the Great Salt Desert, extending from the vicinity of Koom and Kashan, to the sea of Durra, termed also the Lake of Zerrah; and from the province of Kerman to that of Mazanderan. Its length is therefore about 400 miles, and its breadth more than 200. This may be said to join the deserts of Kerman and Seistan, which stretch further to the east, and, like those of Arabia, are all impregnated with nitre. The precise nature of these wastes is scarcely known, but they are interspersed with salt lakes; and in many parts the surface is covered with a crust of brittle earth, or a succession of hills, consisting of particles of the finest red sand, so light as to be almost impalpable, which the violent winds of the desert often raise into a moving cloud, destructive to all life. Smaller deserts occupy other parts.

Modern Persia is singularly poor in rivers, for the Indus, Oxus, Euphrates, and Tigris, as well as the Heirmund, which feeds the lake of Zerrah, are now all beyond her frontier. None that remain are navigable for above three or four miles. We may mention the Karoon, the Kerah, and the Arras or Araxes, as the principal. Various smaller streams descend from the mountains, but are generally soon lost in the dry sandy plains: some few reach the southern shores of the Caspian. On the banks of these streams, however, are some of the most beautiful and fertile plains of the world.

Persia contains several extensive salt lakes. The largest is that of Urumea, near the city of that name, between the Caspian and the western frontier. Its circumference is computed at 300 miles. The shape of this lake is oval, and the waters very salt and clear, emitting a disagreeable sulphureous smell. Mr. Kinneir did not, however, find them encrusted with salt, as some writers have asserted. It contains numerous islands, one of which forms a peninsula when the water is low, and is about twenty-five miles in circuit, inhabited by wild asses, and deer, and other game. Another of these salt lakes is Baktegan, ten miles south-east of Shiraz, and noted for the purity of its salt. Its shape is long and narrow, and its circuit about seventy-five miles. It is nearly dry in summer, when the people who live on its borders collect the salt from the bottom. It is the final receptacle of the river that passes Ispahan. The great lake of Zerrah is at present chiefly included in the dominions of Cabul, and only touches the eastern confines of Persia. The Persian Gulf will be found noticed by us distinctly.

The climate partakes of a variety similar, though arising from very different causes, to that of our own country, and the order of the seasons is very similar to ours. From the end of May to that of September, the heat in the low grounds and sandy deserts of the interior is frequently extreme; but on the sides of the mountains and elevated plains, though the higher peaks are still covered with snow, the summer is mild and agreeable. At Teheran, the present metropolis,

the heat of s[illegible]hat the king generally quits the capital, and encamps on the adjacent plains; but the winters, to the north of Shiraz, and in higher latitudes, are often severe. Such is their severity at Teheran and Tabreez, that all communication between these towns and the neighbouring villages is frequently suspended for several weeks. The winds that blow over the hot deserts often raise the temperature of the adjacent districts. At Kashan, the heat has been found to exceed that at the village of Kohrood, about twenty-five miles distant, by 20° of Fahrenheit; a difference which can only be accounted for by the proximity to the former place of the Great Salt Desert. From a meteorological journal, kept by Dr. Jukes at Bushire, a port in the upper part of the Persian Gulf, in 1807, it appears that in June, July, August, and September, Fahrenheit's thermometer often rose to 96°, and was never lower than 80°. Throughout the whole of October it did not sink below 72°, but sometimes rose above 90°. On the 29th of December, 1808, the thermometer fell to 30°, but during nearly the whole of the month it had ranged from 40° to upwards of 72°. The place where the observations were made was on a peninsula, exposed to the cooling breezes of the sea. In most places the difference between the temperature of the day and night is great; and a cool wind often springs up in the evening which lasts nearly the whole night, and diffuses such a freshness that warm clothing is sometimes necessary. Sir John Malcolm says, 'In the year 1810, when encamped on the plain of Kubatoo, in Kurdistan, the water in my tent froze to nearly half an inch thick on the 17th of August. The lat. was 36° N., and Fahrenheit's thermometer, at six A. M., stood at 34°.' The transition from heat to cold is sometimes very sudden. Rain seldom falls except in the provinces of Ghilan and Mazanderan. On the whole the air is dry, the atmosphere almost always clear, and the country, perhaps, the most healthy in the east. As so little rain falls, the dews are less copious than in Hindostan.

The soil partakes the diversity of the climate: the centre and south are arid in a high degree, and entirely destitute of trees; while, on the shore of the Caspian, timber is abundant. The well watered plains of Ghilan and Mazanderan yield the sugar-cane in considerable plenty; but even the grains of the temperate climates can only be raised southward by artificial watering, a process to which the indolence of the Persian farmer does not allow him to apply. A vast extent of the empire is therefore abandoned to pasture, and tenanted by nomade tribes, like those of Tartary and Arabia. This portion has unfortunately acquired a great extension, in consequence of the political calamities and internal feuds to which this country has been long exposed.

Of the most favored districts a traveller above cited remarks:—'The valleys of the central provinces of Persia abound with all the rarest and most valuable vegetable productions, and might be cultivated to any extent. The pasture grounds of that country are not surpassed by any lands in the world. Trees are seldom found except near towns and villages; but the luxuriance with which they grow, wherever planted, shows that the climate is congenial to them. The orchards of Persia produce all the fruits of the temperate zone, and its wilds abound with flowers that can only be reared by care and cultivation in the gardens of Europe.' The plain of Schiraz is the boast of Persia, and indeed of the eastern world; that of Ispahan is only second to it. The fruit every where may be said to be most excellent, and the gardens are cultivated with the greatest care. The vine flourishes in several provinces. The wine of Schiraz is considered superior to any other in Asia; that produced on the sides of the Caucasian mountains is also highly esteemed. Cotton, indigo, and tobacco, are also raised in various parts. Among the common vegetables are peas, beans, carrots, turnips, and cucumbers: and the potato has been lately introduced. Rhubarb, opium, senna, saffron, assafœtida, and other drugs, are also found.

In the northern provinces the mulberry is so extremely abundant as to render silk the staple produce of the empire. In these provinces considerable traces of the superior culture of former times abound. Throughout the country the husbandman, ruined by war or oppression, has often deserted his fields, and wandering tribes have descended from the mountains to occupy his place. Territories therefore formerly distinguished for fertility are now rendered wholly unfit for culture. The artificial canals, which supplied them with the necessary moisture, have been suffered to dry up: and the salt, with which the soil and waters are every where impregnated, has often accumulated and formed a species of crust on the surface of the ground, so as to render it capable of producing only soda and saline plants. Scarcely any where does the husbandman enjoy a moment's security from cheepaos or the forays of freebooters. Mr. Morier, being attacked by a predatory chief, in the plain of Shuster, defeated and carried him prisoner to Ram Hormuz. The governor of that place, however, assured him that he could not with safety take any violent measures against so powerful an individual. He even advised Mr. M. to take advantage of the incident, by engaging this person to conduct him safely through the rest of his journey, on condition of regaining his liberty; and this was found in fact the only safe measure.

Persia is noted both for its horses and dogs: the former, although neither so swift nor so beautiful as those of Arabia, excel them in size and strength. The most valuable are of the Turcoman breed; and a chupper or courier has been known to travel from Teheran to Bushire, a distance of 700 miles, on the same horse, in ten days. Superior mules, asses, and camels, are also used. The mules are small, but well shaped and strong. The camels equal those of Arabia, and are much used in all the eastern and desert part of the country; but the western regions are too mountainous for this animal. Buffaloes are found, together with large flocks of goats and sheep, in the uplands: lions, tigers, and bears, in the forests of Ghezan and Mazanderan; while beautiful zebras roam wild over many of the plains of the interior. They are extremely diffi-

cult to take. Most of the poultry of Europe is also bred in Persia, except the turkey. Insects abound in the damp and marshy places on the borders of the Caspian, near the shores of the Persian gulf, and towards the banks of the Tigris; and locusts, snakes, and scorpions, visit the southern parts.

The most extraordinary mineral production of Persia is that of naphtha or bitumen, found in pits three feet in diameter, and ten or twelve deep, which fill of themselves after a certain period. This forms a most excellent substitute for pitch. The bottoms of most of the vessels which navigate the Euphrates and Tigris are covered with it; and it is used by the natives, instead of oil, for lamps. There is also a white naphtha, which, however, is suspected to be a different substance. It is found floating, like a crust, on the surface of the water, does not possess the qualities of pitch, but affords a more agreeable light. A black and liquid petroleum, of an agreeable odor, flows in small quantity from a mountain in Kerman. The king reserves it for himself to be used in presents; and the mines are carefully sealed and guarded. The turquoise, a precious stone peculiar to Persia, is found in the mountains of Khorassan. Here also the king demands a choice of all that the mine produces; but the merchants have found the secret of evading this monopoly, and of carrying off the jewels. Silver, lead, iron, and copper, are met with in the provinces of Kerman and Mazanderan. The mineral waters of the country are entirely neglected.

The existing government of Persia is entirely absolute: the reigning king being judged the vicegerent of the prophet, and entitled to the most implicit obedience. He is absolute master of the lives and properties of his subjects; and the first man in the empire who disputes or neglects his commands may instantly be stript of his dignities, and publicly bastinadoed. The grand vizier and lord high treasurer exercise generally the executive power; but in the capital the king sits daily to administer justice. The punishments are very severe; and the barbarous system of mutilation frequent. Many of the wandering tribes, however, are ruled by their own khans, who merely pay occasional military service to the state. At a former period all the provinces were thus ruled by hereditary rulers who felt a solid interest in the welfare of the people; but these have been removed, and the new officers study only to enrich themselves. The weakness thus induced has probably been one main cause of that series of destructive revolutions to which Persia has been subject, since the reign of Shah Sophi, who made this change. The khans who still retain hereditary sway, having at their command the most warlike part of the population, are much courted by the monarch.

Persia has at the present time scarcely any thing like a regular army. The most efficient consists of the royal slaves, as they are termed with great propriety, 3000 in number, a considerable part of whom have been disciplined after the European manner. The royal guards, amounting to 10,000, have lands assigned them round the ca[illegible]y a body of militia. The [illegible] rests mainly upon the wandering tribes, who are alike excited by loyalty and the desire of plunder, to join the standard of the shah, but who often revolt to the enemy. This force, consisting entirely of cavalry, may, it is said, by a great effort, be raised to 150,000 or 200,000 men. The Persians have no idea of tactics. In their reviews the soldiers pass along one by one, and have their arms examined. In making war, they fly round the enemy, and endeavour to cut off his provisions and water; seeing him thoroughly exhausted, they make a sudden onset, and overwhelm him. Persia is always to be easily conquered, but is retained with difficulty. The Russians, like their ancient enemies, notwithstanding their superiority in the field, have never been able to extend their frontier much beyond the Araxes.

The people, though oppressed on every side, are gay, lively, and active. Their dress is much lighter than that of their Turkish neighbours, and profusely adorned with ornaments: ostentation is indeed a reigning principle. A sabre will often be made worth from 15,000 to 30,000 piastres. There is no country where the beard is regarded with equal veneration. During the day it is washed, repeatedly combed, and adjusted, for which purposes a pocket-mirror is constantly in use: the rich even adorn it with jewellery.

The Persians are the most learned and polite nation of the east. They employ in their conversation the most extravagant hyperboles: and, to make their sincerity appear the greater, they contrive, when a traveller is passing, to be overheard expatiating in his praise to a third person. Their whole conduct consists principally, we are told, of a train of fraud and artifice; and they never return to fair dealing till they find a man able to detect their impostures. Presents are looked for with great avidity.

There are two regular classes of poets, one whose theme is philosophy, and the other whose lyre is devoted to love. At the head of the former is Sadi, of the latter Hafiz. They dwell chiefly of course upon the beauties of the beloved object, which are treated in the utmost detail, upon the miseries of absence, &c. Rigid Mahometans scarcely consider it lawful to peruse the works of Hafiz. Morality is taught by proverb, apologue, and fables, usually clothed in verse. The following is their circle of sciences, according to the order in which they are studied: grammar and syntax, theology, philosophy, mathematics, and finally medicine and astrology. Their diligence in study is said to be extraordinary, and the greatest attention is paid to education. The three ranks of wise men bear the titles of Taleb, Mollah, and Moushtehed.

The whole nation are Mahometans, of the sect of Sunnites, or Ali, who, on that ground, are viewed by the Turks with greater abhorrence than Christians. The Persians, however, are not intolerant, but listen without anger to the professions or arguments of those who hold a different belief. The exception, perhaps, is in the case of the Guebres, or worshippers of fire, who are now almost extirpated; a remnant only of about 4000

being found i[illegible]wns of Kerman. The Persians generally have the utmost confidence in charms, talismans, sentences of Ali written upon parchment, lucky and unlucky days, &c.

To a considerable extent they are a manufacturing people, and in the brilliancy of their dyes and colors surpass the Turks, and perhaps even Europeans. To the latter they have communicated that exquisite blue tint called ultra marine. The wool produced here is manufactured into stuffs of various form and fineness; and those unrivalled carpets, to which we give the name of Turkey, are in fact wrought principally by females of the Persian tribes. The wool produced by the goats of Kerman is also made into shawls of considerable fineness. Silk is a great staple, either by itself, or mixed with cotton and wool; and the Persians excel in brocade, embroidery, and tapestry of all kinds. Muskets, pistols, and carabines, are made and mounted in most of the great towns: and Khorassan contains a manufactory of sword blades, the founders of which were, it is said, transported from Damascus by Timur. Leather, paper, and porcelain, nearly equal to that of China, are also among the manufactures. Bushire is now the only Persian port in the gulf, the chief commerce of which is carried on by way of Bussora. The commercial intercourse of Persia is, therefore, chiefly carried on by caravans with Turkey, Tartary, and India.

The PERSIAN GULF.—The Gulf of Persia (Sinus Persicus) is entered from the Gulf of Muscat through the Strait of Ormus, eleven leagues wide, between Cape Mussendom and Cape Bambaruck on the Persian shore. This gulf differs from the Red Sea in being almost entirely free from coral reefs, though it has many islands. It is beyond the limits of the monsoons, but the position and nature of the neighbouring countries produce periodical winds, which blow up and down the gulf as in the Red Sea, north-west winds prevailing for nine months, from October to July, and south-east the other three months. The former is called by the Arabs shimaul, and the latter shurquee. For about forty days, commencing at the middle of June, the north-west wind blows with great violence, and is called the grand shimaul. In March and April these winds also blow very strong for about twenty days without intermission; and at this time the current sets strong up the gulf against the wind. During the period of the prevailing south-east winds, hard but transient gales from the south-west are sometimes experienced towards the entrance of the gulf. The currents are observed to run into the gulf from May to September; and out during the rest of the year. In the middle of the gulf the current generally sets down, but is weak: along the shores small tides prevail. The prevailing winds seem to depend on the nature of the neighbouring countries, and the position of the gulf north-west and south-east. To the south-east and east are the Arabian Sea and the sandy deserts of Persia, the atmosphere of which must be more rarified for a greater part of the year than that to the north and north-west, where are the Black and Caspian Seas and the cold Caucasus: hence north-west winds prevail the greater part of the year, and are strongest in the summer months, when the air to the south is most rarified by the sea being vertical, and by the melting of the northern snows and ices, producing a stream of condensed air. In the gulf are many springs of fresh water in the sea, particularly one near the Isles of Bahrein.

The Persian Gulf receives at its head the united waters of the two great rivers, Tigris and Euphrates, which have both their sources in the mountains of Caucasus, between the Caspian and Black Seas. Their junction takes place at Korna, thirty leagues above Bussora, and the united waters take the name of the Shat-al-Arab (River of the Arabs) to the sea, into which they empty themselves, amongst banks, by several mouths; of which the western one alone is navigable by ships, and is distinguished from the others by the branches of date trees floating out of it with the stream: its greatest depth is twenty feet, and for twenty-five leagues from its mouth it is free from banks. The other branches are only navigable by boats. The land at the mouth of the river is so low that the date trees are the first objects seen, and in general these trees cover the banks up to Bussora, with a few interspersed patches of rice ground. Vessels of seventy tons go from Bussora to Bagdad; these vessels, from the scarcity of wood, are composed of pieces of every size and species, from the size of a barrel stave upwards, and the whole is covered with dammer, a species of resin used in India instead of pitch, an inch thick, which keeps them from leaking.

The Arabian coast of the gulf, from the Strait of Ormus to Aftan River, 400 miles, is occupied by the Jochassim pirates, whose chief places of rendezvous are Ejmaum, a small town and good port, and Noseilkam, ten leagues from Ejmaum. The sheik of Julfar, whose territory is outside the gulf, on the west of Cape Mussendom, has also a number of pirate dows, mounting four to eighteen guns; but the most powerful of these piratical chiefs is the Chaub, whose capital is Durac (thought to be the Siwa of Alexander), on the east bank of the Euphrates.

The west shore of the Persian Gulf is always avoided by European ships, and consequently is little known. For a distance of sixty leagues from Cape Mussendom there is not known to be any place of shelter. Ras-el-Khima is a large pirate town, on a sandy peninsula, and is, comparatively with other Arab towns, strongly fortified with batteries and towers. In 1809 the British Indian government determined to chastise those pirates, who had long committed depredations on the English trade, and even captured some of the Company's vessels of war, treating the crews with great cruelty; an expedition was consequently sent from Bombay, and their capital, El Khima, was taken by assault, and the fortifications destroyed, together with seventy of their piratical dows. A considerable plunder fell into the hands of the captors, whose loss was only one officer killed, and four men wounded. In latitude about 25° is a place called Seer, with the island Zare to the west; the Pearl Bank is

thought to commence here, and extends along the coast to latitude about 27°. There are many insignificant towns on the coast, from which the pearl fishery is carried on. The most considerable are Lahsa, on Aftan River; Farut, celebrated for its grapes; El-Katif, supposed to be the ancient Gerra, built of salt stone, and where the ruins of a Portuguese fort are seen; Grain, Gran, or Koueit, is forty leagues from El Katif; the coast between is desert, and with many islands. Gran is a town of mats and poles, with 10,000 inhabitants, engaged in the pearl fishery to a considerable extent. Here the East India Company's packets usually wait for the over-land despatches from England.

Bussora, Bassora, Basra or Busra, called by the Arabs Al Sure, or the rocky, from the nature of the surrounding country, is a straggling Arab town, ninety miles from the sea, and one mile and a half from the west bank of the river of the Arabs. A creek runs from the river to the town, by which vessels of seventy tons ascend to the latter. The houses are of sun-dried bricks, with terraced clay roofs, and of a mean appearance. The country round is a level plain, and, except on the immediate banks of the river, without tree or shrub. The climate is not considered healthy; the summers are extremely hot, and the winters cold and wet: the extremes of the thermometer are 110° to 50°. The trade of Bussora is very considerable, it being the principal emporium of the commerce between India and the Turkish dominions. The English East India Company have a factory here.

Cape Jasques, which forms the eastern side of the Strait of Ormus, has a square white perforated cliff, like a tower, projecting into the sea. East of the cape a river empties itself into the north-west angle of Jasques Bay. Its mouth is crossed by a bar, with but seven or eight feet high-water, and four fathoms and a half within. The Persian shore of the gulf, towards its entrance, is occupied by Arabs, generally independent of the Persian dominion, who subsist by navigation, fishing, and piracy. Ascending the Persian shore of the gulf, the places of any note, in succession, are Mina, on the River Ibrahim. Gombroon, or Bender Abassi (Port of Abbas), was formerly a celebrated mart, but at present is nearly deserted, and in ruins. It is situated at the foot of a hill opposite Kismish Island, is unhealthy, and without water, but what is preserved in cisterns from the rains. Kongon, or Kungoon, is a considerable town, with some trade; the coast is here lined with stupendous mountains, rugged and barren. Cape Verdistan, or Burdistan, has a shoal running out from it three leagues to the south.

Bushire (Bender Abou-scher), the principal fort of the Persians in the gulf, is an ill-built town of 1200 houses, of white stone or sunburnt bricks, surrounded by a wall with some bastions, merely sufficient to protect it from the insults of the Arabs. It is built on a point of land which is insulated in high tides. Vessels of ten feet draft run up the river to the town, but those of burden cannot approach the river's mouth nearer than five miles. The water procured here is extremely brackish, though brought ten miles [illegible] remains of the Portuguese fact[illegible]e still to be seen, as are the ruins of Reeshire, a large town in the time of their power, four miles south of Bushire. The English East India Company have a resident here. Its trade is considerable, being properly the seaport of Schiraz, with which it has a constant commercial communication by caravans, and from it Persia is principally supplied with India merchandise, for which it pays in specie.

The Gulf of Persia has, as we have said, several islands of note, of which the first towards the entrance is the celebrated Ormus, six miles long, and two leagues from Bender-Abassi. It is a totally barren rock, the low parts of which are covered with a crust of salt resembling snow. Its inhabitants are few, and chiefly subsist by collecting sulphur, of which they furnish cargoes to some small vessels. They are dependent for fresh water on what is preserved in cisterns in the rains.

Larak Isle, a league south-west of Ormus.

Kishmish (Oaracta), the largest island in the gulf, is twenty leagues long east and west, but not two broad; it is populous and well cultivated, producing wheat and other grain. On the east side is a good port named Congo, but fit only for small vessels; it has however a spring of excellent water, almost the only one in the gulf. Near the middle of the south side is Angar Isle, three miles long, occupied by wild sheep and hogs.

Mamouth and Selim, also called Mamet and Salamet, Kaze and Nabajou, and by English seamen the tombs, the ancient Aradus, are two small isles three leagues from the west side of Kismish.

Poliore and Knobflore, also called Souri and Abou-mousa, are barren islets. Souri looks like a two masted vessel.

Kyen, or Keish Island, is low, fruitful, and inhabited.

Busheab, or Sheik-Saib, is of considerable size, well inhabited, and covered with date trees. On the east side is a town occupied by pirates.

Karek, or Kharedje (Icarah), north of Bushire, is three leagues long and two broad, has 1500 inhabitants, and is tolerably cultivated, producing wheat, rice, and barley; it abounds with goats, but has few other animals. On the north are the ruins of a Dutch factory, established between 1750 and 1765. The island at present is subject to the sheik of Bushire; on its south side is fresh water, convenient for shipping. Pilots are usually taken here for Bussora. In the centre of the island is a hill, with coral and sea shells on its summit, and courses of lava are observed on its sides. The isles Bahrein, Baharein, are, as their name signifies, two in number; they lie before Aftan River, five leagues from the main. The largest, named Anal by the Arabs, the ancient Tylos, is level, covered with date trees, and has a fortified town. The south-east, and smallest, is called Samak; they are celebrated for the great pearl fishery carried on near them; they are subject to the sheik of Bushire.

PERSIAN LANGUAGE. The claims and characters of this important dialect of human speech have been so well illustrated and enforced in mo-

dern times, 'ones, that we cannot wi of them in this place.

The history of the *Persian language*, according to Sir W. Jones, may be divided into four periods, like that of the empire; under each dynasty there was an apparent change in the dialect of the kingdom, especially under the two last, viz. the 'Sassanian' and 'Mahometan' dynasties; and these are the only periods of which any certain records remain.

In the infancy of the empire, under Cayúmaras and his descendants, it cannot be supposed that any great pains were taken to polish the language. Herodotus assures us that, even after the reign of Cyrus, the whole education of the Persian youth, from the age of five years to twenty, consisted in only three points, riding, throwing the javelin, and the practice of moral virtue; which account is also confirmed by Xenophon. It ought not, however, to be imagined, that the ancient Persians, especially those of the second period, were entire strangers to the art of composition either in verse or prose; but what their language was, what were their rules of versification, or what was the course of their studies, no mortal can pretend to know with any shadow of exactness. The Greeks can give us no assistance, nor are we much enlightened by the writers after Alexander; it is necessary therefore to consult the Persians themselves. From the great traveller Chardin, we learn, that the old Persian is a language entirely lost, in which no books are extant. We have therefore no account of the Persian language till the time of the Sassanian kings, who flourished from the opening of the third century to the middle of the seventh, during which period an academy of physic was founded at Gandisapor, a city of Korosan, and, as it gradually declined from its original institution, it became a school of poetry, rhetoric, dialectics, and the abstract sciences. In this seminary the Persian tongue must have been much refined, and the rusticity of the old idiom was succeeded by a pure and elegant dialect, which being constantly spoken at the court of Beharam Gúr in the year 351, acquired the name of Deri, or courtly, to distinguish it from the pehlavi, pahlavi, or language of the country. This idiom did not, however, supersede the ancient dialect; for several compositions in Pahlavi were extant even after Mahomet, which appear to have been written by order of the Sassanian princes. Anushirvan, surnamed the Just, who reigned at the close of the sixth century, when Mahomet was born, obtained from India a collection of fables, translated by his chief physician from the Sanscrit language, which he acquired for this purpose; this collection he translated into the Pahlavian dialect; about 140 years after it was turned from Pehlavi into Arabic, by order of Almansor, second caliph of the Abassides; and this is the volume now found in every language of Europe, under the name of Calila wa Demma, or the fables of Pilpay. In the reign of Anashirvan Mahomet polished the language of his country; and, when the battle of Cadessia gave the last blow to the Persian monarchy, the whole empire of Iran was reduced under the power of the first Mahometan dynasty: the ancient literature of Persia, which had been promoted by the family of Sassan, was immediately discouraged by the successors of Mahomet; because some Persian romances, brought into Arabia, were extolled to the disparagement of the Koran, the people to whom they were read alleging, that 'the stories of griffons and giants were more amusing to them than the moral lessons of Mahomet.' Accordingly a chapter of the Koran was immediately written to stop the progress of these opinions, and other measures were taken to check their diffusion. This is supposed to have been the moving cause of that enthusiasm of the Mahometans which induced them to burn the famous library of Alexandria, and the records of the Persian empire. It was a long time before the native Persians could recover from the shock of this violent revolution; and their language seems to have been little cultivated under the caliphs, who gave greater encouragement to the literature of the Arabians; but when the power of the Abassides began to decline, and a number of independent princes arose in the different provinces of their empire, the arts of elegance, and chiefly poetry, revived in Persia; and there was hardly a prince, or governor of a city, who had not several poets and men of letters in his train. The Persian tongue was consequently restored in the tenth century; but it was very different from the Deri or Pehlavi of the ancients; it was mixed with the words of the Koran, and with expressions from the Arabian poets, whom the Persians considered as their masters, and affected to imitate in their poetical measures, and the turn of their verses.

The oldest Persian poems, of which Sir W. Jones obtained any knowledge, are those of Ferdúsi, and which, in his account of them, are exhibited as a glorious monument of eastern genius and learning; and of which he further says, that if it should be generally understood in its original language, will contest the merit of invention with Homer himself, whatever be thought of its subject, or the arrangement of its incidents. He has furnished an extract from this poem, and adds, that it will exhibit a specimen of the Persian tongue very little adulterated by a mixture with the Arabic, and in all probability approaching nearly to the dialect used in Persia in the time of Mahomet, who admired it for its extreme softness, and was heard to say, 'that it would be spoken on that account in the gardens of Paradise.' Of these two languages was formed the modern dialect of Persia, which being spoken in its greatest purity by the natives of Pars or Farsistan, acquired the name of Parsi; though it is even called Deri by Hafiz. Nearly in the same age, viz. at the close of the tenth and beginning of the eleventh centuries, the great Aleul Ola, surnamed Alámi from his blindness, published his excellent odes in Arabic, in which he professedly imitated the poets before Mahomet. At this time, and soon after, the Persian language became altogether mixed with Arabic. At Shiraz, called the Athens of Persia, flourished in the thirteenth century, Sadi, a native of this city; who wrote several pieces, both in prose and verse; and by means of an extract from his Gulistan, or Bed of Roses, Sir W. Jones has

shown us how the Persian and Arabic languages were mixed together in his age. The same city had the honor of producing, in the fourteenth century, the most elegant lyric poet of Asia, Shemseddin, surnamed Hafiz; of whose productions Sir W. Jones has transcribed two Gazals or anacreontic odes, with a translation. There is nothing, says our author, which affords a stronger proof of the excellence of the Persian tongue than that it remained uncorrupted after the irruption of the Tartars, who at different times, and under various leaders, made themselves masters of Persia; for the Tartarian princes, and chiefly Tamerlane, who was a patron of Hafiz, were so far from discouraging polite literature, like the Goths and Huns, that they adopted even the language and religion of the conquered country, and promoted the fine arts with a boundless munificence; and one of them, who founded the Mogul empire in Hindostan, introduced the Persian literature into his dominions, where it flourishes to this day; and all the letters from the Indian governors are written in the language of Sadi. The Turks themselves improved their harsh dialect by mixing it with the Persian; and Mahomet II., who took Constantinople in the middle of the fifteenth century, was a protector of the Persian poets, among whom was Noureddin Jami, whose poem On the Loves of Joseph and Zelikha is very highly extolled by our author, who has given a specimen of his elegant style. In the sixteenth and seventeenth centuries, under the family of Sesi, the Persian language began to lose its ancient purity, and even to borrow some of its terms from the Turkish, which was commonly spoken at court.

The characters of the Persian language are written from right to left, and the language consists of thirty-two letters, which vary in their form as they are initials and medials, or finals, both connected and unconnected. For the pronunciation both of the consonants and vowels, we refer to Sir William Jones's Grammar, from which we make the following extracts.

The short vowels are seldom written in the Persian books, and the omission of them occasions a perplexity to the learner of the language. He will soon perceive with pleasure a great resemblance between the Persian and English languages, in the facility and simplicity of their form and construction. The former, as well as the latter, has no difference of termination to mark the gender, either in substantives or adjectives: all inanimate things are neuter, and animals of different sexes either have different names, or are distinguished by certain words, denoting male and female.

The Persian substantives, like ours, have but one variation of case, which is formed by adding a certain syllable to the nominative in both numbers; and answers often to the dative, but generally to the accusative case in other languages. When the accusative is used indefinitely, this syllable is omitted; but when the noun is definite or limited, that syllable is added to it. In Persian there is no genitive case; but when two substantives of different meanings come together, a hesra, or short *e*, is added in reading to the former of them, and the latter remains unaltered. The sam[illegible] before a pronoun posse[illegible]djective. The other cases are expressed, for the most part, as in our language, by particles placed before the nominative. Our article *a* is supplied in Persian by adding the letter *ya*, or as it is sounded *ee*, to a noun, which restrains it to the singular number.

The Persian plural is formed by adding certain characters or syllables to the singular: but these terminations are not, as in many languages, wholly arbitrary; on the contrary, they are regulated with the utmost precision. It must not be omitted that the Arabic substantives frequently have two sorts of plurals: one formed according to the analogy of the Persian nouns, and another after the irregular manner of the Arabians; and this circumstance, besides several others, proves the impossibility of learning the Persian language accurately, without a moderate knowledge of the Arabic: and Sir William Jones advises the learner to peruse with attention the Arabic grammar of Erpenius, of which there are two fine editions, one by Golius, and another by Albert Schultens, before he attempts to translate a Persian manuscript.

The Persian adjectives admit of no variation, but in the degrees of comparison. The positive is made comparative by adding to it one character for a syllable, and superlative by means of another. An adjective is sometimes used substantively, and forms its plural like a noun; if it be a compound adjective, the syllables denoting the plural number and the oblique case are placed at the end of it.

The personal pronouns are, 1, *men*, I: thus, sing. *men*. I; plur. *ma*, we; obl. *merá*, me, *mára*, us. 2. *To*, thou: thus, sing. *to*, thou; plur. *shumá*, you or ye; obl. *tura*, thee; *shumará*, you. 3. *O*, he: thus, sing. *o*, he, she, or it; plur. *ishán*, they; obl. *óra*, him, her, or it; *ishánra*, them. The possessives are the same with the personals, and are distinguished by being added to their substantives. Our reciprocal pronouns, *own* and *self*, are expressed in Persian by certain words, which are applicable to all persons and sexes. For the demonstrative pronouns *this*, *these*, *that*, *those*, in the several cases singular, plural, and oblique, there are appropriate characters or expressions. Certain syllables prefixed to pronouns personal change them into possessives, and are read with a short vowel. The relatives and interrogatives are supplied by the invariable pronouns *ke* and *che*; of which the former usually relates to persons, and the latter to things.

The Persians have active and neuter verbs, like other nations; but many of their verbs have both an active and neuter sense, which can be determined only by the construction. These verbs have properly but one conjugation, and but three changes of tense, the imperative, the aorist, and the preterite: all the other tenses being formed by the help of certain particles, or of the auxiliary verbs signifying *to be*, and *to be willing*. The passive voice is formed by adding the tenses of the verb substantive to the participle preterite of the active. Our author has exhibited the inflexions of the auxiliary verbs, and an analysis of all the tenses of a Persian verb, showing in what manner they are deduced from

the infinitiv[illegible]nsidered by the oriental gra[illegible]pring and fountain of all the moods and tenses, and which, therefore, in Arabic is called the masdar, or the source. The Persians are very fond of the participle preterite; and it is very often used by their elegant writers to connect the members of a sentence, and to suspend the sense till the close of a long period. In poetry it sometimes is used like the third person preterite of a verb. Our author has subjoined a table of the moods and tenses, as they answer to those of European languages.

In the ancient language of Persia there were very few or no irregularities: the imperative, which is often irregular in the modern Persian, was anciently formed from the infinitive, by rejecting the termination *eeden*; for originally all infinitives ended in *den*, till the Arabs introduced their harsh consonants before that syllable, which obliged the Persians, who always affected a sweetness of pronunciation, to change the old termination of some verbs into *ten*, and by degrees the original infinitives grew quite obsolete; yet they still retain the ancient inperatives, and the aorists which are formed from them. This little irregularity is the only anomalous part of the Persian language, which, nevertheless, far surpasses in simplicity all other languages, as Sir William Jones says, ancient or modern, of which he has any knowledge.

One of the chief beauties of the Persian language is the frequent use of compound adjectives; in the variety and elegance of which it surpasses not only the German and English but even the Greek. These compounds are thought so beautiful by their poets that they sometimes fill a distich with them.

The construction of the Persian tongue is very easy, and may be reduced to a few rules, most of which it has in common with other languages. The nominative is usually placed before the verb, with which it agrees in number and person. It is remarked, however, that many Arabic plurals are considered in Persian as nouns of the singular number, and agree as such with verbs and adjectives. Another irregularity in the Persian syntax is, that the cardinal numbers are usually joined to nouns and verbs in the singular. The adjective is placed after its substantive, and the governing noun is prefixed to that which it governs. Conjunctions which express conjecture, condition, will, motive, &c., require the conjunctive or potential mood. Prepositions and interjections are fixed to nouns in the nominative case. The modern Persians borrowed their poetical measures from the Arabs, and they are very various and complicated.

The Persian elegy differs only in its length from the ode, except that the cassideh often turns upon lofty subjects, and the gazal comprises for the most part the praises of love and merriment, like the lighter odes of Horace and Anacreon. Sir William Jones, among other numerous translations, has given us a translation in verse of a beautiful Persian song by Hafiz. But we must now content ourselves with referring to the close of Sir William Jones's Persian Grammar, or to his Works, vol. 5, for further information on these interesting topics.

PERSIAN WHEEL. See HYDROSTATICS.

PERSICA, the peach, is by Linnæus referred to the same class and genus with amygdalus; however, as they are reckoned different genera, by Tournefort and others, we shall here mention the three principal species of the persica most remarkable for the beauty of their flowers. 1. P. Africana, the double-flowering dwarf almond. 2. P. humilis, the dwarf almond. These two reach not above the height of three or four feet, though their flowers are of equal beauty with the 3. P. vulgaris, the common peach tree, with double flowers. It is a very great ornament in gardens, producing very large double flowers of a beautiful red or purple color, and growing to a considerable size. Numerous other species of peach trees, with their culture, uses, &c., are described under AMYGDALUS.

PERSICARIA, in botany. See POLYGONUM.

PERSICUM MARE, or PERSICUS SINUS, in ancient geography, a part of the sea which the Romans called Mare Rubrum, and the Greeks Mare Erythræum; washing Arabia Felix on the east, between which and Carmania, entering into the land, it washes Persia on the south. Its large mouth consists of straight sides, like a neck, and then the land retiring equally a vast way, and the sea surrounding it in a large compass of shore, there is exhibited the figure of a human head (Mela). Theophrastus calls this bay Sinus Arabicus.

PERSIMON. See DIOSPYROS. From the persimon is made a very palatable liquor in the following manner:—As soon as the fruit is ripe a sufficient quantity is gathered, which is very easy, as each tree is well stocked with them. These persimon apples are put into a dough of wheat or other flour, formed into cakes; and put into an oven, in which they continue till they are quite baked and sufficiently dry, when they are taken out again: then, in order to brew the liquor, a pot full of water is put on the fire, and some of the cakes are put in: these become soft by degrees as the water grows warm, and crumble in pieces at last; the pot is then taken from the fire, and the water in it well stirred about, that the cakes may mix with it: this then poured into another vessel, and they continue to steep and break as many cakes as are necessary for a brewing: the malt is then infused, and they proceed as usual with the brewing. Beer thus prepared is reckoned much preferable to other beer. They likewise make brandy of this fruit in the following manner: Having collected a sufficient quantity of persimons in autumn they are altogether put into a vessel, where they lie for a week till they are quite soft; then they pour water on them, and in that state they are left to ferment of themselves, without any addition. The brandy is then made in the common way, and is said to be very good, especially if grapes (in particular of the sweet sort), which are wild in the woods, be mixed with the persimon fruit. Some persimons are ripe at the end of September, but most of them later, and some not before Novem-

ber and December, when the cold first overcomes their acrimony. The wood of this tree is very good for joiners' instruments, such as planes, handles to chisels, &c., but if after being cut down it lies exposed to sunshine and rain, it is the first wood which rots, and in a year's time there is nothing left but what is useless. When the persimon trees get once into a field, they are not easily got out of it again, as they spread greatly.

PERSIS, a Roman lady, whom St. Paul salutes in his epistle to the Romans (xvi. 12), and calls his beloved sister. She is not honored by any church, which is something singular.

PERSIS, in ancient geography, a province of Persia, bounded by Media, Carmania, Susiana, and the Persian Gulf. It is used by some authors for Persia itself.

PERSIST', *v. n.*
PERSIST'ANCE, *n. s.*
PERSIST'ENCY,
PERSIST'IVE, *adj.*
} Lat. *persisto*; Fr. *persister.* To persevere; continue firm; not to desist: the noun substantive and adjective follow these senses.

Thou thinkest me as far in the devil's book, as thou and Falstaff, for obduracy and *persistency.*
Shakspeare.

The protractive tryals of great Jove,
To find *persistive* constancy in men. *Id.*

The love of God better can consist with the indeliberate commissions of many sins, than with an allowed *persistance* in any one.
Government of the Tongue.

If they *persist* in pointing their batteries against particular persons, no laws of war forbid the making reprisals. *Addison.*

Nothing can make a man happy but that which shall last as long as he lasts: for an immortal soul shall *persist* in being, not only when profit, pleasure, and honour, but when time itself shall cease.
South.

PERSIUS FLACCUS (Aulus), a Latin poet in the reign of Nero, celebrated for his satires. He was born, according to some, at Volterra in Tuscany; and, according to others, at Tigulia, in the gulf of Specia, in the year 34. He was educated till twelve years old at Volterra; and afterwards at Rome, under Palæmon the grammarian, Virginius the rhetorician, and Cornutus the stoic, who contracted a friendship for him. Persius consulted that illustrious friend in the composition of his verses. Lucian also studied with him under Cornutus; and was so charmed with his verses that he was incessantly breaking out into acclamations at the beautiful passages in his satires. He was a steady friend, a good son, an affectionate brother and parent. He was chaste, meek, and modest: which shows how wrong it is to judge of a man merely by his writings; for the satires of Persius are not only licentious, but sharp and acrimonious. Persius was of a weak constitution, and troubled with a weak stomach, which was the cause of his death in the thirtieth year of his age. Six of his satires remain; in their judgments of which the critics have been much divided, excepting as to their obscurity. Yet his style is grand, figurative, poetical, and suitable to the dignity of the stoic philosophy: and hence he shines most in recommending virtue.

PER'SO[illegible] ne; Ital.
PER'SONABL[illegible] Lat. *persona.*
PER'SONAGE, *n. s.*
PER'SONAL, *adj.*
PERSONAL'ITY, *n. s.*
PERSONA'TION,
PERSONIFICA'TION,
PERSON'IFY, *v. a.*
An individual human being; see the extracts from Locke; a man or woman considered as opposed to, or distinct from, things; or considered as present; one's o[illegible]elf, appearance, character, or office; in gram[illegible] a quality of the noun which modifies the verb: personable means of good or handsome person; graceful: personage (Fr. *personage*), a considerable or eminent person; exterior character or appearance; stature: personal belonging to a human being; proper to an individual; present; real; corporeal; external; in law, that which is moveable or supposed appendant to the person; not real; not land: in grammar, a personal verb is that which has all the regular modifications of the three persons; opposed to an impersonal one, that has only the third: personality is individuality; individual existence; it is also used in modern parlance for personal reflection or remark: personally follows the senses of personal: to personate is represent; pass for a given or supposed person; hence pretend; counterfeit; represent as in a picture; describe: but the last senses are disused: personation is used by Bacon for counterfeiting another's person: personification is, in rhetoric, prosopopœia, the change of things to persons, as 'Confusion heard his voice:' to personify is, thus to change a thing, or give it personal attributes.

Him that accepteth not the *persons* of princes, nor regardeth the rich more than the poor. *Job.*

Dorus the more blushed at her smiling, and she the more smiled at his blushing; because he had, with the remembrance of that plight he was in, forgot in speaking of himself the third *person.*
Sidney.

It was a new sight fortune had prepared to those woods, to see these great *personages* thus run one after the other. *Id.*

All things are lawful unto me, saith the apostle, speaking, as it seemeth, in the *person* of the Christian gentile for the maintenance of liberty in things indifferent. *Hooker.*

Every man so termed by way of *personal* difference only. *Id.*

Approbation not only they give, who *personally* declare their assent by voice, sign, or act, but also when others do it in their names. *Id.*

If I am traduced by tongues which neither know
My faculties nor *person*;
'Tis but the fate of place, and the rough brake
That virtue must go through. *Shakspeare.*

For her own *person*,
It beggared all description. *Id.*

I then did use the *person* of your father;
The image of his power lay then in me:
And in the administration of his law,
While I was busy for the commonwealth,
Your highness pleased to forget my place. *Id.*

She hath made compare
Between our statures, she hath urged his height
And with her *personage*, her tall *personage*,
She hath prevailed with him. *Id.*

For my part,
I know no *personal* cause to spurn at him;
But for the general. *Id. Julius Cæsar.*

The fav'rit
In deputation
When he was *personal* in the Irish war.
Shakspeare.

I could not *personally* deliver to her
What you commanded me, but by her woman
I sent your message. *Id. Henry VIII.*

The lofty cedar *personates* thee. *Shakspeare.*

I am thinking what I shall say; it must be a *personating* of himself; a satire against the softness of prosperity. *Id.*

Were it true that her son Ninias had such a stature, as that Semiramis, who was very *personable*, could be taken for him; yet it is unlikely that she could have held the empire forty-two years after by any such subtilty. *Raleigh.*

The rebels maintained the fight for a small time, and for their *persons* shewed no want of courage. *Bacon.*

When I purposed to make a war by my lieutenant, I made declaration thereof to you by my chancellor; but now that I mean to make a war upon France in *person*, I will declare it to you myself. *Id. Henry VII.*

From his first appearance upon the stage, in his new *person* of a sycophant or juggler instead of his former *person* of a prince, he was exposed to the derision of the courtiers and the common people. *Bacon.*

She bore a mortal hatred to the house of Lancaster, and *personally* to the king. *Id.*

This lad was not to *personate* one, that had been long before taken out of his cradle, but a youth that had been brought up in a court, where infinite eyes had been upon him. *Id.*

This being one of the strongest examples of a *personation* that ever was, it deserveth to be discovered and related at the full. *Id.*

This sin of kind not *personal*,
But real and hereditary was. *Davies.*

He hath put on the *person* not of a robber and murtherer, but of a traitor to the state. *Hayward.*

The lord Sudley was fierce in courage, courtly in fashion, in *personage* stately, in voice magnificent, but somewhat empty of matter. *Id.*

It is not easy to research the actions of eminent *personages*, how much they have blemished by the envy of others, and what was corrupted by their own felicity. *Wotton.*

Herself a while she lays aside, and makes
Ready to *personate* a mortal part. *Crashaw.*

Piety is opposed to that *personated* devotion under which any kind of impiety is disguised. *Hamm.*

Thus have I played with the dogmatist in a *personated* scepticism. *Glanville's Scepsis.*

This was then the church which was daily increased by the addition of other *persons* received into it. *Pearson.*

It is hard to *personate* and act a part long; for, where truth is not at the bottom, nature will always be endeavouring to return, and will peep out and betray herself one time or other. *Tillotson.*

'Tis in her heart alone that you must reign;
You'll find her *person* difficult to gain. *Dryden.*

The king in *person* visits all around,
Comforts the sick, congratulates the sound,
And holds for thrice three days a royal feast. *Id.*

A *person* is a thinking intelligent being, that has reason and reflection, and can consider itself as itself, the same thinking thing in different times and places. *Locke.*

If speaking of himself in the first *person* singular has so various meanings, his use of the first *person* plural is with greater latitude. *Id.*

It could not mean, that Cain as elder had a natural dominion over Abel, for the words are conditional; if thou doest well: and so *personal* to Cain. *Id.*

Person belongs only to intelligent agents, capable of a law, and happiness and misery: this *personality* extends itself beyond present existence to what is past, only by consciousness, whereby it imputes to itself past actions, just upon the same ground that it does the present. *Id.*

A zeal for *persons* is far more easy to be perverted, than a zeal for things. *Sprat.*

How different is the same man from himself, as he sustains the *person* of a magistrate and that of a friend! *South.*

The great diversion is masking; the Venetians, naturally grave, love to give into the follies of such seasons, when disguised in a false *personage*. *Addison.*

This heroic constancy determined him to desire in marriage a princess, whose *personal* charms were now become the least part of her character. *Id.*

Our Saviour in his own *person*, during the time of his humiliation, duly observed the Sabbath of the fourth commandment, and all other legal rites and observations. *White.*

This immediate and *personal* speaking of God Almighty to Abraham, Job, and Moses, made not all his precepts and dictates, delivered in this manner, simply and eternally moral; for some of them were *personal*, and many of them ceremonial and judicial. *Id.*

Public reproofs of sin are general, though by this they lose a great deal of their effect; but in private conversations the applications may be more *personal*, and the proofs when so directed come home. *Rogers.*

The converted man is *personally* the same he was before, and is neither born nor created a-new in a proper literal sense. *Id.*

To that we owe the safety of our *persons* and the propriety of our possessions. *Atterbury.*

It has been the constant practice of the Jesuits to send over emissaries, with instructions to *personate* themselves members of the several sects amongst us. *Swift.*

Some persons must be found out, already known by history, whom we may make the actors and *personages* of this fable. *Broome.*

Be a *person's* attainments ever so great, he should always remember that he is God's creature. *Clarissa.*

If he imagines there may be no *personal* pride, vain fondness of themselves, in those that are patched and dressed out with so much glitter of art or ornament, let him only make the experiment. *Law.*

These fables Cicero pronounced, under the *person* of Crassus, were of more use and authority than all the books of the philosopher. *Baker on Learning.*

Sir Robert Walpole rewarded him with twenty guineas; a much greater sum than he afterwards obtained from a *person* of yet higher rank. *Johnson.*

His works are such as a writer bustling in the world, showing himself in public, and emerging occasionally from time to time into notice, might keep alive by his *personal* influence. *Id.*

Is it possible, gentlemen, that *persons* of so acute understandings as those who were arrayed against me to-day, should not see, that if a minister ought not to be a member of parliament, the converse would be equally true, that the crown ought not to choose a member of parliament for its minister? And what would be the consequence? *Canning.*

PERSON, in grammar, is applied to such nouns or pronouns as, being either prefixed or under-

stood, are the nominatives in all inflections of a verb; or it is the agent or patient in all finite or personal verbs. See ENGLISH LANGUAGE.

PERSONAL ACTION, in law, is an action levied directly and solely against the person; in opposition to a real or mixed action. See ACTION.

PERSONAL GOODS or CHATTELS, in law, signifies any moveable thing belonging to a person, whether alive or dead. See CHATTELS.

PERSONATÆ, the fortieth order in Linnæus's Fragments of Natural Method, consisting of plants whose flowers are furnished with an irregular gaping or grinning petal, which in figure somewhat resembles the snout of an animal (see BOTANY, Index). Most of the genera of this order are arranged under the class and order didynamia angiospermia. The rest, although they cannot enter into that artificial class and order, for want of the classic character, the inequality of the stamina; yet, in a natural method, which admits of greater latitude, may be arranged with those plants which they resemble in their habit and general appearance, and particularly in the circumstances expressed in that title.

PERSONIFICATION, PERSONIFYING, or PERSONALISING, the giving an inanimate being the figure, sentiments, and language of a person. See ORATORY. Dr. Blair, in his Lectures on Rhetoric, gives this account of personification. 'It is a figure the use of which is very extensive, and its foundation laid deep in human nature. At first view, and when considered abstractedly, it would appear to be a figure of the utmost boldness, and to border on the extravagant and ridiculous. For what can seem more remote from the tract of reasonable thought than to speak of stones and trees, and fields and rivers, as if they were living creatures, and to attribute to them thought and sensation, affections and actions? One might imagine this to be no more than childish conceit, which no person of taste could relish. In fact, however, the case is very different. No such ridiculous effect is produced by person[illegible] employed; on the contrary, [illegible] natural and agreeable, nor is any very uncommon degree of passion required in order to make us relish it. All poetry, even in its most gentle and humble forms, abounds with it. From prose it is far from being excluded; nay, in common conversation, very frequent approaches are made to it. When we say, the ground thirsts for rain, or the earth smiles with plenty; when we speak of ambition's being restless, or a disease being deceitful; such expressions show the facility with which the mind can accommodate the properties of living creatures to things that are inanimate, or to abstract conceptions of its own forming.' The Doctor goes on to investigate the nature of personification at considerable length. And he adds a very proper caution respecting the use of it in prose compositions, in which this figure requires to be used with great moderation and delicacy. The same liberty is not allowed to the imagination there as in poetry. The same assistances cannot be obtained for raising passion to its proper height by the force of numbers and the glow of style. However, addresses to inanimate objects are not excluded from prose; but have their place only in the higher species of oratory. A public speaker may on some occasions very properly address religion or virtue; or his native country, or some city or province, which has suffered perhaps great calamities, or has been the scene of some memorable action. But we must remember that, as such addresses are among the highest efforts of eloquence, they should never be attempted unless by persons of more than ordinary genius: for if the orator fails in his design of moving our passions by them, he is sure of being laughed at. Of all frigid things, the most frigid are the awkward and unseasonable attempts sometimes made towards such kinds of personification, especially if they be long continued.'

PERSPECTIVE.

PERSPECTIVE, *n. s.* Fr. *perspectif;* Lat. *perspicio.* A glass through which objects are viewed; the view taken; the science of delineating objects on a plane.

We have *perspective* houses, where we make demonstrations of all lights and radiations; and out of things uncoloured and transparent, we can represent unto you all separate colours. *Bacon.*

If it tend to danger, they turn about the *perspective* and show it so little, that he can scarce discern it. *Denham.*

It may import us in this claim, to hearken to the storms rising abroad; and by the best *perspectives,* to discover from what coast they break. *Temple.*

You hold the glass, but turn the *perspective,*
And farther off the lessened object drive. *Dryden.*

Lofty trees, with sacred shades,
And *perspectives* of pleasant glades,
Where nymphs of brightest form appear. *Id.*

Medals have represented their buildings according to the rules of *perspective.* *Addison on Medals.*

Faith for reason's glimmering light shall give
Her immortal *perspective.* *Prior.*

How richly were my noon-tide trances hung
With gorgeous tapestries of pictured joys!
Joy behind joy, in endless *perspective!* *Young.*

PERSPECTIVE is a branch of the science of optics which teaches how to represent the objects of vision on a plane surface.

Vitruvius says that the first who wrote a treatise on this subject was Agatharcus, a disciple of Æschylus, and that subsequently his principles were elucidated and improved by Democritus and Anaxagoras. None of these treatises of the ancients, however, have come down to modern times. It is to the revival of painting in Italy that we must trace the existing art; and it seems to have owed its reviviscence particularly to that branch of painting which was employed in the decorations of the theatres.

The Arabian optician Alhazen, who flourished about the year 1100, should not be omitted,

however, in [illegible] ers. Roger Bacon cites hi[illegible] himself on the subject with creditable accuracy.

The earliest writer whose rules of perspective survive is Peter del Borgo, an Italian, who died in 1443. He supposed objects to be placed beyond a transparent tablet, and endeavoured to trace the images which rays of light, emitted from them, would make upon it. What success he had in this attempt we know not, as his book on this subject has perished. It is, however, very much commended by the famous Ignatius Dante; and, upon the principles of Borgo, Albert Durer constructed a machine, by which he could trace the perspective appearance of objects. Balthazar Perussi studied the writings of Borgo, and endeavoured to make them more intelligible. To him we owe the discovery of points of distance, to which all lines that make an angle of 45° with the ground line are drawn.

Not long after, another Italian, Guido Ulbaldi, observed that all the lines that are parallel to one another, if they be inclined to the ground line, converge to some point in the horizontal line, and that through this point also a line drawn from the eye, parallel to them, will pass. These principles put together enabled him to make out a pretty complete theory of perspective.

His work was published at Pesaro in 1600, and may be said to have contained the fundamental principles of the system of Gravesande and Dr. Brook Taylor; the outline, in fact, of the only system worth the student's attention. For, while this is a science of the first importance to a painter, he is not, at the same time, to be too strictly confined to its rules. Nothing, indeed, should be permitted to tie up his hands or cramp his genius; on the contrary, he should be left fully at liberty to express his idea with one stroke of his pencil; and, as Fresnoy advises, 'let the compasses be rather in his eyes than in his hands;' in that way let him measure distinctly every object by comparison—the principal talent which he should own. If he is well acquainted with the principles of his art, he will not stop at the dry rules of geometry, while his fancy is sketching all the chief parts of his picture; but proceed with the whole, and, when the design is arranged, then correct all those portions which require it by the laws of perspective.

But while, on the one hand, we are anxious to guard the student against dwelling too much on the more mechanical parts of his interesting art, we must, on the other, strive to impress on his mind that a thorough knowledge and an undeviating attention to this important branch of it is not only eligible but indispensable. The study of it should, indeed, go hand in hand with that of anatomy, as not less fundamental and necessary.

The contour of an object drawn upon paper or canvas represents nothing more than such an intersection of the visual rays sent from the extremities of it to the eye as would arise on a glass put in the place of the paper or canvas. Now, the situation of an object at the other side of a glass being given, the delineation of it in the glass itself depends entirely on the situation of the eye on this side of the glass; in other words, on the rules of perspective.

To understand these, suppose a person at a window looks through an upright pane of glass at any object beyond it, and keeping his head steady, draws the figure of the object upon the glass with a black lead pencil, as if the point of the pencil touched the object itself; he would then have a true representation of the object in perspective as it appears to his eye.

To do this, let the glass be laid over with strong gum water, which, when dry, will be fit for drawing upon, and will retain the traces of the pencil; and then let the student look through a small hole in a thin plate of metal, fixed about a foot from the glass, between it and his eye, and keep his eye close to the hole; otherwise he might shift the position of his head, and consequently make a false delineation of the object.

After tracing out the figure of the object, he may go over it again with pen and ink; and, when that is dry, put a sheet of paper upon it, and trace it thereon with a pencil; then taking away the paper and laying it on a table, he may finish the picture by giving it the colors, lights, and shades, as he sees them in the object, of which he will now have a true resemblance.

To such as have a general knowledge of the principles of optics, this must be self-evident: for as vision is occasioned by pencils of rays coming in straight lines to the eye from every point of the visible object, it is plain that, by joining the points in the transparent plane, through which all those pencils respectively pass, an exact representation must be formed of the object as it appears to the eye in that particular position, and at that determined distance; and could pictures of things be always first drawn on transparent planes, this simple operation, with the principle on which it is founded, would comprise the whole theory and practice of perspective. As this, however, is far from being the case, rules must be deduced from the sciences of optics and geometry for drawing representations of visible objects on opaque planes; and the application of these rules constitutes what is properly called the art of perspective.

Before we lay down the further principles of this art, it is proper to observe, that when a person stands directly opposite to the middle of one end of a long avenue, which is straight and equally broad throughout, the sides thereof seem to approach nearer to each other in proportion as they are farther from his eye; or the angles, under which their different parts are seen become gradually less, according as the distance from his eye increases; and, if the avenue be very long, the sides of it at the farthest end seem to meet: and there an object that would cover the whole breadth of the avenue, and be of a height equal to that breadth, would appear only to be a mere point.

Having made these preliminary observations, we now proceed to

Sect. I.—Definitions of the Terms used in Perspective.

1. The *horizontal line* is that line supposed to be drawn parallel to the horizon through the eye

of the spectator; or rather, it is a line which separates the heaven from the earth, and which limits the sight. Thus A and B, plate Perspective, fig. 1, are two pillars below the horizontal line C D, because the eye is elevated above them; in fig. 2 they are said to be equal with it; and in fig. 3 raised above it. Thus, according to the different points of view, the objects will be either higher or lower than the horizontal line.

2. The *point of sight* A, fig. 4, is that which makes the centrical ray on the horizontal line *a b*; or it is the point where all the other visual rays D, D, unite.

3. The *points of distance* C, C, fig. 4, are points set off in the horizontal line at equal distances on each side of the point of sight A.

4. And in the same figure B B represents the *base line* or *fundamental line*.

5. E E is the *abridgment* of the square, of which D, D, are the *sides*.

6. F, F, the *diagonal lines* which go to the points of distance C, C.

7. *Accidental points* are those where the objects end; these may be cast negligently, because neither drawn to the point of sight, nor to those of distance, but meeting each other in the horizontal line. For example, two pieces of square timber, G and H, fig. 5, make the points I, I, I, I, on the horizontal line; but go neither to the point of sight K, nor to the points of distance C, C; these accidental points serve likewise for casements, doors, windows, tables, chairs, &c.

8. The *point of direct view*, or *of the front*, is when we have the object directly before us; in which case it shows only the fore side; and, if below the horizon, a little of the top; but nothing of the sides, unless the object be polygonous.

9. The *point of oblique view* is when we see an object aside of us and as it were aslant, or with the corner of our eye; the eye, however, being all the while opposite to the point of sight; in which case we see the object laterally, and it presents to us two sides or faces. The practice is the same in the side points as in the front points; a point of sight, points of distance, &c., being laid down in the one as well as in the other.

10. *Projection* delineates objects *in plano* by means of right lines called rays, supposed to be drawn from every angle of the subject, to particular points. When the objects are angular, these rays necessarily form pyramids, having the plane or superficies whence they proceed for their basis; but, when drawn from or to circular objects, they form a cone.

11. *Ichnography*, or ichnographic projection, is described by right lines parallel among themselves and perpendicular to the horizon from every angle of every object, on a plane parallel to the horizon: the points where the perpendicular lines or rays cut that plane being joined by right lines. The figure projected on the horizontal plane is likewise called the plan or seat of that object on the ground plane. The points are the sites, or seats, of the angles of the object. The lines are the seats of the sides. By this we are to understand how the basis of figures represented as superstructures stand or are supported; and we are further enabled to judge of, indeed to measure, their several parts and their areas.

12. *Orthog*[illegible]vertical position and appearance of an object; and hence orthographic projection is called the *elevation*. When we see the front of a house represented, we give it that term; when the side, we denominate it the *profile*. If we suppose a house, or other object, to be divided by a plane passing perpendicularly through it in a line at right angles with the point, we call it the lateral section; but, if the plane pass in a direction parallel with the front, it is termed a longitudinal section. If the plane passes in neither of the former directions (not however deviating from the vertical), it is said to be an oblique section.

13. These afford us the means of laying down plans, of showing the parts and the manner in which the interiors of edifices are arranged, consequently are indispensable to the architect or surveyor, and indeed should be understood by every individual connected any way with designing or building. Nor should the following be neglected;—namely, *scenography*, which shows us how to direct the visual rays to every point or part of a picture; and *stereography*, which enables us to represent solids on a plane, from geometrical projection; whence their several dimensions, viz. length, breadth, and thickness, may all be represented, and correctly understood at sight.

14. An *original object* is that which becomes the subject of the picture, and is the parent of the design.

15. *Original planes* or *lines* are the surfaces of the objects to be drawn; or they are any lines of those surfaces; or they are the surfaces on which those objects stand.

16. *Perspective plane* is the picture itself, which is supposed to be a transparent plane, through which we view the objects represented thereon.

17. *Vanishing planes* are those points which are marked upon the picture by supposing lines to be drawn from the spectator's eye parallel to any original lines, and produced until they touch the picture.

18. *Ground plane* is the surface of the earth, or plane of the horizon, on which the picture is imagined to stand.

19. The *ground line* is that formed by the intersection of the picture in the ground plane.

20. *Vanishing points* are the points marked down in the picture by supposing lines to be drawn from the spectator's eye parallel to any original lines, and produced until they touch the picture.

21. The *centre* of a picture is that point on the perspective plane where a line drawn from the eye perpendicular to the picture would cut it; consequently it is that part of the picture which is nearest to the eye of the spectator.

22. The *distance* of the picture is that from the eye to the centre of the picture. The distance of a vanishing point is the distance from the eye of the spectator to that point where the converging lines meet, and, after gradually diminishing all the objects which come within their direction and proportion, are reduced so as, in fact, to terminate in nothing. All parallel lines have the same vanishing points; that is to say, all such as are, in building, parallel to each other,

when not r ite to, and parallel wi to converge towards some remote point, i.e. their vanishing point. Circles, when retiring in such manner, are represented by ellipses, proportioned to their distances: their dimensions in perspective are ascertained by enclosing them, or the nearest of them, where a regular succession is to be portrayed, within a square, which, being divided into any number of equal parts or chequers, will exhibit all the proportions of those more remote.

23. A *bird's eye view* is supposed to be taken from some elevated spot which commands a prospect nearly resembling the plane or ichnography of the places seen. Thus the view from a high tower, or from a mountain, whence the altitudes of the various objects on the plane below appear much diminished, gives nearly the same representation as is offered to a bird flying over them—and hence the term. Some idea of this may be obtained by standing on any height, and observing how low those objects which are near thereto will appear when compared with those more distant; taking however the perspective diminution of the latter into consideration.

When a painter has formed a scene in his mind, and supposed, as is customary, that the principal figures of this scene lie close, or almost close, to the back of his canvas, he is, in the next place, to fix on some point on this side of the canvas from which he would choose his piece should be seen. But in choosing this point, which is called the *point of sight*, regard should be had to its situation to the right or left of the middle of the canvas; but, above all things, to its distance and height with respect to the lower edge of the canvas; which edge is called the *base line*, and is parallel with the horizontal line which passes through the eye. For by assuming the point of sight, and consequently the horizontal line, too low, the planes upon which the figures stand will appear a great deal too shallow; as, by assuming it too high, they will appear too steep, so as to render the piece far less light and airy than it ought to be. In like manner, if the point of sight is taken at too great a distance from the canvas, the figures will not admit of degradation enough to be seen with sufficient distinctness: and, if taken too near it, the degradation will be too quick and precipitate to have an agreeable effect. Thus, then, it is evident that no small attention is requisite in the choice of this point.

When a picture is to be placed on high, the point of sight should be assumed low, and vice versâ: in order that the horizontal line of the picture may be, as near as possible, in the same horizontal plane with that of the spectator; for this disposition has a surprising effect. When a picture is to be placed very high, as, amongst many others, that of the Purification, by Paolo Veronese, it will be proper to assume the point of sight so low that it may lie quite under the picture, no part of whose ground is in that case to be visible; for, were the point of sight to be taken above the picture, the horizontal ground of it would appear sloping to the eye, and both figures and buildings as ready to tumble headforemost It is true, indeed, that there is seldom a necessity for such extraordinary exactness; and that, unless in some particular cases, the point of sight had better be high rather than low: as a reason for which we may observe that, as we are more accustomed to behold people on the same plane with ourselves than either higher or lower, the figures of a piece must strike us most when standing on a plane nearly level with that on which we ourselves stand. To this it may be added that by placing the eye low, and greatly shortening the plane, the heels of the back figures will seem to bear against the heads of the foremost, so as to render the distance between them far less perceptible than it would otherwise be. The point of sight being fixed, according to the situation in which the picture is to be placed, the *point of distance* is next to be determined. In doing this a painter should carefully attend to three things:—first, that the spectator may be able to take in, at one glance, the whole and every part of the composition; secondly, that he may see it distinctly; and, thirdly, that the degradation of the figures and other objects of the picture be sufficiently sensible.

Sect. II.—General Rules.

1. Let every line which in the object or geometrical figure is straight, perpendicular, or parallel to its base, be so also in its scenographic delineations, or in the description, in all its dimensions, such as it appears to the eye; and let the lines which in the object return at right angles from the fore right side, be drawn in like manner scenographically from the point of sight.

2. Let all straight lines which in the object return from the fore right side, run in a scenographic figure, into the horizontal line.

3. Let the object you intend to delineate, standing on the right hand, be placed also on the right hand of the point of sight; that on the left hand, on that hand of the same point; and that which is just before, in the middle of it.

4. Let those lines which, in the object, are equidistant from the returning line, be drawn in the scenographic figure from that point found in the horizon.

5. In setting off the altitude of columns, pedestals, &c., measure the height from the base line upward in the front or fore right side; and a visual ray down that point in the front shall limit the altitude of the column, or pillar, all the way behind the front side, or orthographic appearance, even to the point of sight. This rule must be observed in all figures, as well where there is a front, or fore right side, as where there is none.

6. In delineating ovals, circles, arches, crosses, spirals, and cross arches, or any other figure in the roof of a room, first draw ichnographically, and so, with perpendiculars from the principal points thereof, carry it up to the ceiling, from which several points carry on the figure.

7. The centre in any scenographic regular figure is found by drawing cross lines from the opposite angles; for the point where the diagonals cross is the centre.

8. A ground plane of squares is alike, both above and below the horizontal line; only the

more it is distant either above or below the horizon, the squares will be so much the larger or wider.

9. In drawing a perspective figure where many lines come together, to direct your eye, draw the diagonals in red, the visual lines in black, the perpendiculars in green, or any other color different from that which you intend the figure shall be.

10. Having considered the height, distance, and position of the figure, and drawn it accordingly, with its side or angle against the base, raise perpendiculars from the several angles or designed points, from the figure to the base, and transfer the length of each perpendicular, from the place where it touches the base, to the base on the side opposite to the point of distance. Thus the diametrals to the perpendiculars in the base, by intersection with the diagonals drawn to the several transferred distances, will give the angles of the figures; and so lines drawn from one point to another will circumscribe the scenographic figure.

11. If in a landscape there be any standing waters, as rivers, ponds, &c., place the horizontal line level with the farthest sight or appearance of it.

12. If there be houses, churches, castles, towers, mountains, ruins, &c., in the landscape, consider their position, that you may find from what point in the horizontal lines to draw the front and sides of them in the picture.

13. In drawing objects at a great distance, observe the proportions, both in magnitude and distance, in the draught, which appear from the object to the eye.

14. In coloring and shadowing near objects, you must make the same colors and shades in your picture which you observe with your eye in the landscape; but, according as the distance becomes greater, the colors must be fainter, till at last they are gradually lost in a darkish sky-color.

Sect. III.—Mechanical Illustrations of Drawing in Perspective.

1. Suppose L L D B A, fig. 6, plate Perspective, a square piece of pavement, consisting of twenty-five pieces of marble, each a foot square: it must be measured exactly, and laid regularly down upon paper; and for the sake of a more distinct notion how every particular square will appear when you have a true perspective view of them, mark every other stone or marble black; or else number each of them as in the figure, which is divided into squares, every other one of which may be made to appear black, like the three at the bottom marked B C D: or 1, 2, 3, 4, answering to those which are marked in the perspective with the same numbers. To lay your plan in perspective, fix your point of sight as you observe in the figure; or more or less to the right or left; then draw the line K K parallel to, and at what distance you will from L L; and raise a line on each side from L to K, to form the figure you see, as a frame; then draw a line from the corner K, which is the point of distance, to the opposite corner L; and this line will regulate your work. Now draw lines from the squares of your plan to the point of sight, as exact as possible; and, wherever you [illegible] those lines, draw lines parallel to the line L L, which will give you the squares in perspective, or the true figure of every square. Thus D, in the perspective plan, answers to B in the measured plan, and 1, 2, 3, and 4, answer to their corresponding squares in the same plan.

To raise either pillars, trees, houses, or any other bodies, according to their respective heights, at different distances and proportions, on the plan laid down, measure them out in perspective into squares of a foot or any other measure. Let one of these squares, 1, 4, in fig. 7, serve for the base of a pillar a foot thick. Mark the line L K, by the scale of the ground plan, into equal proportions or feet; *a*, *b*, *c*, *d*; which being so many feet high, and standing on the base, are uprights, not in perspective. Then draw a line, 4 5, parallel to 1 *c*. Join *c* and 5, and then you have the front of a body three feet high and one foot wide, which is the object you were to raise. From 4 draw a line with a black lead pencil, to the point of sight; and from 3 raise a line parallel to 4 5, till it touches the pencilled line passing from 5 to the point of sight, which will give you the side appearance of the column or body, as you will see it from the place where you stand.

Then, with a pencil, from *c* draw a line to the point of sight, which will determine the line 6 7 that bounds the perspective view of the column a-top. Afterwards from 2 raise a pencilled line parallel to *a c* or 1 *c*, till it touches the line drawn from c to the point of sight; then draw 6 7 parallel to c 5, and you will have the square of the top of the column as observed from A, which is supposed to be the place where you stand. It is to be observed that the line drawn from 2 to 6 is only imaginary, and in consequence is to be rubbed out, because, not being seen from the place where you stand, it must not appear in the drawing. The same may be understood of the line drawn from 1 to 2; but it is necessary that they appear in the draught, as they direct you how to regulate the top of your column, and to place it with certainty upon its base.

Lastly, finish your column with lines only, that is, from 1 to *c*, from 4 to 3, from 3 to 7, from *c* to 5, from 6 to 7, and from 1 to 4, whereby you will have the true representation of the column, as in fig. 8.

When this is done, you may erect other columns on the other squares in the same manner, observing to fling your shades all on one side, and being master of these few examples, which will cost very little trouble, you will find the principle of them apply to various objects.

For the construction of a camera obscura, 1. Darken the room E F, fig. 10, leaving only an aperture open in the window at V, on the side I K, facing the prospect A B C D. 2. In this aperture fit a lens, either plano-convex, or convex on both sides. 3. At a due distance, to be determined by experience, spread a paper or white cloth, unless there be a white wall; then on this, G H, the desired objects A B C D will be delineated invertedly. 4. If you would have them appear erect, place a concave lens between the centre and the focus of the first lens, or receive the image on a plane speculum inclined to the

horizon under [illegible]ave two lenses included [illegible]ad of one. If the aperture do not exceed the bigness of a pea, the objects will be represented without any lens at all. And thus the objects may be drawn or copied to the greatest degree of accuracy. The student will adopt any of these methods which he finds will be most suitable to his purpose; but the camera obscura is that which is most generally used by painters. This method has also the additional advantage of giving the student a correct idea of coloring from nature.

Sect. IV.—Rules and Examples in Scenographic Perspective, &c.

1. Suppose the pentagon A B D E F, fig. 1, plate II., required to be represented by the rules of perspective on the transparent plane V P, placed perpendicularly on the horizontal plane H R, dotted lines are imagined to pass from the eye C to each point of the pentagon C A, C B, C D, &c., which are supposed, in their passage through the plane P V, to leave their traces or vestiges in the points *a*, *b*, *d*, &c., on the plane, and thereby to delineate the pentagon *a b d e f*; which, as it strikes the eye by the same rays that the original pentagon A B D E F does, will be a true perspective representation of it.

2. To find the perspective appearance of a triangle, H B C, fig. 2, between the eye and the triangle, draw the line D E, which is called the fundamental line; from 2 draw 2 V, representing the perpendicular distance of the eye above the fundamental line, be it what it will; and through V draw, at right angles to 2 V, H K parallel to D E; then will the plane D H K E represent the transparent plane, on which the perspective representation is to be made. Next, to find the perspective points of the angles of the triangle, let fall perpendiculars A 1, C 2, B 3, from the angles to the fundamental D E; set off these perpendiculars upon the fundamental, opposite to the point of distance K, to B, A, C. From 1, 2, 3, draw lines to the principal point V; and from the points A, B, and C, in the fundamental line, draw the right lines A K, B K, C K to the point of distance K; which is so called, because the spectator ought to be so far removed from the figure or painting, as it is distant from the principal point V. The points *a*, *b*, and *c*, where the visual lines V 1, V 2, V 3, intersect the lines of distance A K, B K, C K, will be angular points of the triangle *a b c*, the true representation of A B C. By proceeding in this manner with the angular points of any right-lined figure, whether regular or irregular, it will be very easy to represent it in perspective.

3. If the scenographic appearance of any solid were to be represented, suppose of a triangular prism, the base of which is the triangle *m n o*, fig. 3, you need only find the upper surface of it, in the same manner as you found the lower, or base; and then, joining the corresponding points by right lines, you will have the true representation of the solid in perspective. So that the work is the same as before; only you take a new fundamental line, as much higher than the former as is the altitude of that solid the scenographic representation of which you would delineate.

4. There is still a more commodious way, which is this: having found, as above, the base or ichnographic plate *m n o*, let perpendiculars be erected to the fundamental line from the three angular points, which will express the altitudes of those points. But because these altitudes, though equal in the body or solid itself, will appear unequal in the scenographic view, the farthest off appearing less than those nearer the eye, their true proportional heights may be thus determined. Any where in the fundamental line, let A B be erected perpendicularly, and equal to the true altitude; or, if the figure have different altitudes, let them be transferred into the perpendicular A B; and from the points A and B, and from all the points of intermediate altitudes, if there be any such, draw right lines to the point of sight V: those lines A V, B V, will constitute a triangle with A B, within which all the points of altitude will be contained. Through the points *o n m*, draw parallels to the fundamental line; and from the points *a*, *a*, &c., erect perpendiculars to those parallels; and the points where they intersect the lines A V, B V, as in *a a*, *b b*, &c., will determine the apparent height of the solid in the scenographic position to the eye in V. In practice, these parallels and perpendiculars are easily drawn, by means of a good drawing board, or table, fitted for the purpose.

5. To exhibit the perspective of a pavement, consisting of square stones, viewed directly: divide the side A B, fig. 4, transferred to the fundamental line D E, into as many equal parts as there are square stones in one row. From the several points of division draw right lines to the principal point V, and from A to the point of distance K draw a right line A K, and from B to the other point of distance L draw another L B. Through the points of the intersections of the corresponding lines draw right lines on each side, to be produced to the right lines A V and B V. Then will *a f g b* be the appearance of the pavement A F G B.

6. To show the perspective appearance of a square A B D C, fig. 5, seen obliquely, and having one of its sides A B in the fundamental line. The square being viewed obliquely, assume the principal point V, in the horizontal line H R, in such a manner, as that a perpendicular to the fundamental line may fall without the side of the square A B, or at least may not bisect it; and make V K the distance of the eye. Transfer the perpendiculars A C and B D to the fundamental line D E; and draw the right lines K B, K D; as also A V and V C: then will A and B be their own appearances, and *c* and *d* the appearances of the points C and D: consequently A*cd*B is the appearance of the square A B D C.

7. If the square A C B D be at a distance from the fundamental line D E, which rarely happens in practice, the distances of the angles A and B must likewise be transferred to the fundamental line; and even the oblique view itself is not very common. The reason why objects appear smaller as they are at a greater distance, is, that they appear according to the angle of the eye, wherein they are seen; and this angle is taken at the eye, where the lines terminating the objects meet.

8. For example, the eye A, fig. 6, viewing the object BC, will draw the rays AB and AC, which give the angle BAC; so that an object viewed under a greater angle will appear larger, and another under a less angle smaller. That, among equal objects, those at the greatest distance appear smallest, and consequently, that in all perspective the remotest objects must be made the smallest, will be manifest from the figure: the objects BC, DE, FG, HI, and KL, being all equal, but at different distances from the eye, it is evident that the angle DAE is less than the angle BAC, that FAG is less than DAE, that HAI is less than FAG, and that KAL is less than HAI. Hence, the second, third, fourth, and fifth objects will appear smaller, though really all equal, inasmuch as the angles diminish in proportion as the objects recede. If the eye, on the other hand, were removed to M, KL would appear the largest, and BC no bigger than NO.

9. It follows that, as objects appear such as is the angle they are seen under, if several lines be drawn between the sides of the same triangle, they will all appear equal: thus all the lines comprised between the sides ON and OP, fig. 7, of the triangle NOP, will appear equal to each other: and, as objects comprehended under the same angle seem equal, so all comprehended under a greater angle must seem greater, and all under a smaller angle less.

10. This being premised, if there be a number of columns or pilasters to be ranged in perspective on each side of a hall, church, or the like, they must of necessity be all made under the same angle, and all tend to one common point in the horizon O, fig. 8. For instance, if from the points D, E, the eye being placed at A, and viewing the first object DE, you draw the visual rays DO and EO, they will make the triangle DOE, which will include the columns DE, FG, HI, KL, MN, so as they will all appear equal.

11. What has been said of the sides is likewise to be understood of the ceilings and pavements; the diminutions of the angles of remote objects, placed either above or below, following the same rule as those placed laterally. Trees, being ranged by the same law, have the same effect as the columns, &c.; for being all comprehended in the same angle, and the two rays having each its own angle, and all the angles meeting in a point, they form a third, which is the earth, and a fourth, which may be supposed the air, and thus afford an elegant prospect.

12. To exhibit the perspective of a circle, if it be small, circumscribe a square about it: draw diagonals and diameters *ha* and *dc*, fig. 9, intersecting each other at right angles; and draw the right lines *fg* and *bc* parallel to the diameter *de* through *b* and *f*; as also through *f* and *g* draw right lines meeting the fundamental line in the points 3 and 4. To the principal point V draw right lines V 1, V 3, V 4, V 2; and to the points of distance L and K draw the right lines L 2 and K 1. Lastly, connect the points of intersection, *a, b, d, f, h, g, e, c*, with the arches *ab, bd, df*, &c. Thus will *a b d f h g e c* be the appearance of the circle.

13. If the circle be large, on the middle of the fundamen[illegible]be a semicircle, and from th[illegible]the periphery C, F, G, H, I, &c., to the fundamental line, let fall perpendiculars C 1, F 2, G 3, H 4, I 5, &c. From the points A, 1, 2, 3, 4, 5, &c., draw right lines to the principal point V; as also a right line from B to the point of distance L, and another from A to the point of distance K. Through the common intersection draw right lines, as in the preceding case: thus we shall have the points *e, f, g, h, c*, which are the representations of these, A, C, F, G, H, I, which being connected as before give the projection of the circle. Hence it appears not only how any curvilinear figure may be projected on a plane, but also how any pavement consisting of any kind of stones may be delineated in perspective. If any complicated figure be proposed, it may not be easy to apply the practical rules to the description of every minute part; but by enclosing that figure in a regular one properly subdivided, and reduced into perspective, a person skilled in drawing may with ease describe the objects proposed.

Upon the whole, where the boundaries of the proposed object consist of straight lines and plain surfaces, they may be described directly by the rules of perspective: but when they are curvilinear, either in their sides or surfaces, the practical rules can only serve for the description of such right-lined cases as may conveniently enclose the objects, and which will enable the student to draw them within those known bounds with a sufficient degree of exactness. It would indeed be a fruitless task, to seek, by the practical rules of perspective, to describe all the little hollows and prominences of objects; the different lights and shades of their parts, or their smaller windings and turnings; the infinite variety of the folds in drapery; of the boughs and leaves of trees; or the features and limbs of men and animals; much less to give them that roundness and softness, that force and spirit, that eagerness and freedom of posture, that expression and grace, which are requisite to a good picture.

It may appear a bold assertion to say that the very short sketch now given of the art of perspective is a sufficient foundation of the whole practice, and includes all the rules peculiar to the problems which most generally occur. But, the scientific foundation being simple, the structure need not be complex, nor swell into such volumes as have been published on the subject: volumes which, by their size, deter from the perusal, and give this simple art the appearance of mystery. Thus narrowing instead of enlarging the knowledge of the art; until the student, tired of the bulk of the volume, in which a single maxim is tediously spread out, and the principle on which it is founded kept out of sight, contents himself with a remembrance of the maxim, and rarely ascends to first principles.

We subjoin, however, for the information of those who would wish farther to pursue the subject an ample list of approved authors.

In the Latin language we find:—Johannis Cantuariensis, Perspectiva, Pisa, 1508, folio; an Italian translation of which, with notes was

published, b 593, folio. C. Vittellionis, et Projectione Radiorum isus, Luminum, Colorum, atque Formarum, quam vulgo Perspectivam vocant, libri x. Norimb. 1551, folio, with plates. Joa. Fr. Niceroni, Taumaturgus Opticus Studiosissimus Perspectivæ, Paris, 1638, folio; a French translation of this appeared also at Paris, under the title of Perspective Curieuse, 1663, folio. Guido Ubaldus, Perspectiva, 1600, folio. Perspectiva Horaria, Auct. Em. Maignan, Rome, 1648. Andrea Putel, surnamed Porzi, Perspectiva Pictorum et Architectorum (Latin and Italian), Rome, 1693—1700, 2 vols. folio, with 226 engravings. This very useful work has also appeared in Latin and German, translated into the latter by J. Boxbath and G. C. Bodenner, Augsburgh, 1706—1709, folio. Strutt published likewise an edition in Latin and English, London, 1693—1707, folio. Bernard Lamy's book appeared in 1701, in 8vo.; and the ingenious work of S'Gravesande, in 1711, in 8vo., translated into English by Stone in 1724. Ram. Rampinelli, Lectiones Opticæ, Brix. 1760, 4to., with thirty-two plates.

In Italian:—Trattato di Prospettiva di Bern. Zenale da Trevigi, Milan, 1524, folio. Prattica della Prospettiva, di M. Dan Barbaro, Venice, 1559, 1568, 1669, folio, with plates—a very serviceable publication. Dispareri in materia d' Architettura e di Prospettiva, Bresc. 1572, 4to. Le Due Regole della Prospettiva prattica, di Giac. Barozzi di Vignola, con i Comment. del P. Egn. Danti, Rome, 1583, 1611, 1644, folio, Bol. 1682, folio, Venice, 1743, fol. La Prattica di Prospettiva, del Car. Lor. Sirigati, Venice, 1596, 1626, folio. Discorso Intorno al Disegno con gl' Inganni del Occhio, Prospett. Prat. di P. Accolti, Firenza, 1625, folio. Prospettiva Prattica, di Bern. Contino, Venice, 1645, 1684. folio. Paradossi per Praticar la Prospettiva, Senza Saperla, da Giul. Troili, Bol. 1672, 1683, folio. Nuova Prattica di Prospettiva, da Paolo Amato, Pal. 1736, folio. Trattato Teoretico Prattico di Prospettiva, di Eust. Zanotti, Bol. 1766, 4to. with engravings. Della Geometrie e Prospettiva Prattica, di Bald. Orsini, Rome, 1774, 3 vols. 12mo.

In Dutch:—Het Perspectiv Conste van John Friess Vredemann, London, 1559, folio, Amst. 1633, 2 vols. folio. Marolois has given a French translation of this work, entitled La Perspective, Contenant tant la Théorie que la Pratique, Amst. 1662, folio. Onderwysinge in der Perspectiv Conste, door Henr. Hondius, La Hague, 1622, 1647, folio, of which a Latin translation was published at the same place, 1647, folio.

In French:—Livre de Perspective, par J. Cousin, Paris, 1560, folio, 1587, 4to. Leçons de Perspective, par Jaques André du Cerceau, Paris, 1576, folio. La Perspective avec la Raison des Ombres et des Miroirs, par Sal. De Caux, London, 1612, folio. La Perspective of Matth. Josse, in Latin and French, Paris, 1635, folio, with fifty-five plates. La Perspective Pratique Nécessaire à tous les Peintres, Graveurs, et Architectes, par un Religieux de la Comp. de Jésus, Paris, 1642, 4to., 1663, 4to., and 1679, 4to. 3 vols.—There have appeared two English translations of this, one by Prike, 1672, 4to.—the other by Chambers, 1726, folio; and a German translation by J. C. Rembold, Augs. 1710, 4to. Manière Universelle de Gérard Desargues, pour pratiquer la Perspective par petit-pied comme géométral; ensemble les Places et Proportions des fortes et foibles Touches, Teintes, ou Couleurs, par Abr. Bosse, 1648, 2 vols. with 202 engravings. This is one of the most extensive and at the same time important of the works on perspective. It occasioned a great many other writings on the same subject, a detail of which will be found in Lettres écrites au Sieur Bosse, 8vo. The same Abraham Bosse has also given a work entitled Traité des Pratiques Géométrales et Perspectives, Paris, 1665, 12mo. with seventy engravings. Optique de Portraiture et de Peinture, par François Huret, Paris, 1675, folio. Traité de la Perspective où sont contenus les Fondemens de la Peinture, par le P. Bern. Lami, Paris, 1701, 12mo. Amst. 1734, 8vo. An English translation appeared at London in 1702, 12mo. Perspective Pratique d'Architecture, par L. Bretetz, Paris, 1706, 1746, 1752, folio. Traité de la Perspective Pratique, avec des Remarques sur l'Architecture, par le S. Courtonne, Paris, 1710, 1725, folio. Perspective Théorique et Pratique, par M. Ozanam, Paris, 1711, 8vo. Traité de la Perspective à l'usage des Artistes, par E. S. Jeaurat, Paris, 1750, 4to, with 110 engravings. Essai sur la Perspective Pratique, par Le Roy, Paris, 1757, 12mo. Raisonnement sur la Perspective pour en faciliter l'usage aux Artistes, par M. Petitot, Parma, 1758, folio, in French and Italian. Essai sur la Perspective Linéaire et sur les Ombres, par le Chevalier de Curel, Strasb. 1766, 8vo. Traité de Perspective Linéaire, par S. N. Michel, Paris, 1771, 8vo. La Perspective Aérienne Soumise à des Principes puisés dans la Nature, ou Nouveau Traité du Clair-obscur et de Chromatique, à l'usage des Artistes, par M. de St. Morien, Paris, 1789, 8vo. Elémens de Perspective Pratique, à l'usage des Artistes, par Valenciennes, Paris, 4to. Lavit, Perspective Linéaire.

In English: — Practical Perspective made Easy, by Mason, 1670, folio. Architectural Perspective, by Peake, folio. Perspective made Easy, by W. Halfpenny, 1731, 4to. Stereography, or a complete Body of Perspective, in all its Branches, by J. Hamilton, London, 1738, 1749, folio, with 130 engravings. Humphry Ditton's book, 1712, folio. Two Treatises, by Brook Taylor, one in 1715, the other in 1719. Oakley's Magazine of Architecture, Perspective, and Sculpture, 1730, folio. Perspective made Easy in Theory and Practice, by J. Kirby, London, 1755, 1768, 4to. Perspective of Architecture, deduced from the principles of Brook Taylor, and performed by two rules only of universal application, by the same, London, 1755, 1761, 2 vols. folio. The art of Drawing in Perspective made Easy to those who have no previous Knowledge of Mathematics, by J. Ferguson, London, 1755, 1778, 8vo. Practice of Perspective, by J. Highmore, 1784, 4to. Theory of Perspective in a Method Entirely New, by

J. L. Cowley, London, 1766, 2 vols. 4to. Familiar Introduction to the Theory and Practice of Perspective, by J. Priestley, London, 1770, 8vo. The Elements of Linear Perspective demonstrated by Geometrical Principles, by Edward Noble, London, 1771, 8vo. A Complete Treatise on Perspective, in Theory and Practice, on the Principles of Dr. Brook Taylor, by T. Malton, London, 1776, folio. Ware's Complete Body of Architecture contains a Treatise on Perspective, 1760, folio. A Practical Treatise of Perspective on the Principles of Dr. Brook Taylor, by Edward Edwards, second edition, 1806. A thin 4to., without the author's name, entitled A New Treatise on Perspective, Founded on the Simplest Principles, containing Universal Rules for Drawing the Representation of any Object on a Vertical Plane, 1810. The work of D. Cresswell, A.M, 1811, 8vo. Milne, in his Elements of Architecture, 1812, 4to., and Mr. Hayter's work, 1813, 8vo. Martin, Muller, and Emerson, have also given treatises in their mathematical courses.

Works on this subject, under the following denominations, have appeared in the German language:—Of Perspective, as it regards the Arts, 1509, folio, with thirty-seven wood-cuts. Gualt. Henr. Rivius, New Perspective, or The True Foundation of the Arts of Design, Nuremberg, 1547, folio. John Lautensak, Instructions on the Use of the Compass and Rule, particularly in Perspective, Franckf. 1567, folio. Perspectivum Corporum Regularium, &c., par Jamitzer, Nuremberg, 1564, folio. Lud Bruns. Practice of Perspective, &c., Leipsic, 1615, folio, Lenkart, Treatise on Perspective, Augs. 1616, folio. Alberti on Perspective and Shading, Nürnb. 1623-7, folio. Schubler, Instructions on Perspective, &c., Nürnb. 1719-20, 2 vols. folio, with fifty engravings. Lucidum Prospectivæ Speculum, by P. Heinecken, Augs. 1727, folio, with ninety-three engravings. Ibid. 1753, folio, with 126 engravings. Summary Instructions on Perspective, by John Christopher Bischof, Halle, 1741, 8vo. Instructions on the manner of tracing all Elevations in Perspective, without having regard to a plan, by J. H. Lambert, Zurich, 1759, 8vo., and 1774, 8vo. A French translation appeared in 1759, 8vo. Manner of learning to draw by means of Geometry and Perspective, by Werner, Erfort, 1764, 8vo. Detailed Instructions on Perspective, after an easy and clear method, by C. Phil. Jacobz, Amst. 1767, 8vo., with sixty plates. Treatise on Perspective, by Luc. Voch, Augs. 1780, 8vo. Elements of Perspective for the use of Painters, by Burja, Berlin, 1793, 8vo.

The reader may also turn with advantage to Leçons de Perspective, par L. le Bicheur, Ludovico Cigoli, on Perspective. Perspectiva Practica, by Franc. De Breuil. The work of Albert Durer on the Proportions of the Human Body, Nürnberg, 1528, folio. The second book of the Architettura of Seb. Serlio, Paris, 1545, folio. The fifth book of Trattato dell' Arte della Pittura, of Lomazzo, Milan, 1585, 4to. Museo Pittorico, by Velasco, Madrid, 1715, folio. Remarques sur les Tableaux en jeu d'Optique, in the French Mercury for the year 1763, &c. &c.

Perspec[illegible]rt of giving a due diminu[illegible]o the strength of the light, shade, and colors of objects, according to their different distances, the quantity of light which falls on them, and the medium through which they are seen.

As the eye does not judge of the distance of objects entirely by their apparent size, but also by their strength of color, and distinction of parts; so it is not sufficient to give an object its due apparent bulk according to the rules of stereography, unless at the same time it be expressed with that proper faintness and degradation of color which the distance requires. Thus if the figure of a man, at a distance, were painted of a proper magnitude for the place, but with too great a distinction of parts, or too strong colors, it would appear to stand forward, and seem proportionally less, so as to represent a dwarf situated nearer the eye, and out of the plane on which the painter intended it should stand. By the *original color* of an object is meant that color which it exhibits to the eye when duly exposed to it in a full open uniform light, at such a moderate distance as to be clearly and distinctly seen.

This color receives an alteration from many causes, the principal of which are the following: 1. From the object's being removed to a greater distance from the eye, whereby the rays of light which it reflects are less vivid, and the color becomes more diluted and tinged in some measure, by the faint bluish cast, or with the dimness or haziness of the body of air through which the rays pass. 2. From the greater or less degree of light with which the object is enlightened; the same original color having a different appearance in the shade, from what it has in the light, although at an equal distance from the eye, and so in proportion to the strength of the light or shade. 3. From the color of the light itself which falls upon it, whether it be from the reflection of colored light from any adjacent object, or by its passage through a colored medium, which will exhibit a color compounded of the original color of the object, and the other accidental colors which the light brings with it. 4. From the position of the surface of the object, or of its several parts with respect to the eye; such parts of it appearing more lively and distinct than those which are seen obliquely. 5. From the closeness or openness of the place where the object is situated; the light being much more variously directed and reflected within a room than in the open air. 6. Some original colors naturally reflect light in a greater proportion than others, though equally exposed to the same degrees of it; whereby their degradation at several distances will be different from that of other colors which reflect less light.

Perspective Machines, or contrivances for designing or drawing in perspective, are of various kinds. We have described the construction of the camera obscura, and shall here add only the machine suggested originally by Dr. Bevis, and another by Mr. Kirby.

The plane of the former machine is represented fig. 1, Perspective. Plate III. fig. 2 is a representation of it when made use of in draw-

ing distant ol bef, fig. 1, is an oblong resented by A B E F in fig. 2; x and y (X and Y) are two hinges on which the part $c\,l\,d$ (C L D) is moveable. This part consists of two arches or portions of circles $c\,l\,m$ (C L M) and $d\,n\,l$ (D N L), joined together at the top l (L), and at bottom to the cross bar $d\,c$ (D C), to which one part of of each hinge is fixed, and the other part to a flat board, half the length of the board $a\,b\,e\,f$ (A B E F), and glued to its uppermost side. The centre of the arch $c\,m\,l$ is at d, and the centre of the arch $d\,n\,l$ is at c. On the outer side of the arch $d\,n\,l$ is a sliding piece n (much like the nut of the quadrant of altitude belonging to a common globe), which may be moved to any part of the arch between d and l: and there is such another slider, o, on the arch $c\,m\,l$, which may be set to any part between c and l. A thread $c\,p\,n$ (C P N) is stretched tight from the centre c (C) to the slider n (N), and such another thread is stretched from the centre d (D) to the slider o (O); the ends of the threads being fastened to these centres and sliders.

Now it is plain that, by moving these sliders on their respective arches, the intersection p (P) of the threads may be brought to any point of the open space within the arches. In the groove k (K) is a straight sliding bar i (I), which may be drawn farther out, or pushed farther in, at pleasure. To the outer end of this bar I, fig. 2, is fixed the upright piece H Z, in which is a groove for receiving the sliding piece Q. In this slider is a small hole r for the eye to look through in using the machine: and there is a long slit in H Z, to let the hole r be seen through when the eye is placed behind it any height of the hole above the level of the bar I.

In delineating a representation, i. e. of the house $q\,s\,r\,p$, a great way off, place the machine on a steady table, with the end E F of the horizontal board, A B E F, toward the house, so that when the Gothic-like arch D L C is set upright, the middle part of the open space (about P) within it may be even with the house when you place your eye on Z, and look at the house through the small hole r. Then fix the corners of a square piece of paper with four wafers on the surface of that half of the horizontal board which is nearest the house; and all is ready for drawing. Now set the arch upright, as in the figure; which it will be when it comes to the perpendicular side t of the upright piece $s\,t$, fixed to the horizontal board behind D. Then place your eye at Z, and look through the hole r at any point of the house, as q, and move the sliders N and O till you bring the intersection of the threads at P directly between your eye and the point q: then put down the arch flat upon the paper on the board, as at S T, and the intersection of the threads will be at W. Mark the point W on the paper with the dot of a black lead pencil, and set the arch upright again, as before: then look through the hole r, and move the sliders N and O till the intersection of the threads comes between your eye and any other point of the house, as p: then put down the arch again to the paper, and make a pencil mark thereon at the intersection of the threads, and draw a line from that mark to the former one at W; which line will be a true perspective representation of the corner $p\,q$ of the house. Proceed in the same manner by bringing the intersection of the threads successively between your eye and the other points of the outlines of the house, as r, s, &c., and put down the arch to mark the points on the paper at the intersection of the threads: then connect these points by straight lines, which will be the perspective outlines of the house. In like manner find the points of the corners of the door and windows, top of the house, chimneys, &c., and draw the finishing lines from point to point: then shade the whole, making the lights and shades as you see them on the house itself, and you will have a true perspective figure of it. Great care must be taken, during the whole time, that the position of the machine be not shifted on the table; and, to prevent such an inconvenience, the table should be very strong and steady, and the machine fixed to it, either by screws or clamps.

In the same way a landscape, or any number of objects within the field of a view through the arch, may be delineated, by finding a sufficient number of perspective points on the paper, and connecting them by straight or curved lines as they appear to the eye. The arch ought to be at least a foot wide at bottom, that the eye at Z may have a large field of view through it; and the eye should then be, at least, ten inches and a half from the intersection of the threads at P when the arch is set upright. For if it be nearer the boundaries of view at the sides near the foot of the arch will subtend an angle at Z of more than sixty degrees, which will not only strain the eye, but will also cause the outermost parts of the drawing to have a disagreeable appearance. To avoid this, it will be proper to draw back the sliding bar I, till Z be fourteen inches and a half distant from P; and then the whole field of view, through the foot wide arch, will not subtend an angle to the eye at Z of more than forty-five degrees; which will give a more easy and pleasant view, not only of all the objects themselves, but also of their representations on the paper whereon they are delineated. So that, whatever the width of the arch be, the distance of the eye from it should be in this proportion: as 12 is to the width of the arch, so is $14\frac{1}{2}$ to the distance of the eye (at Z) from it. If a pane of glass, laid over with gum water, be fixed into the arch, and set upright when dry, a person who looks through the hole r may delineate the objects upon the glass which he sees at a distance through and beyond it, and then transfer the delineation to a paper put upon the glass. Ferguson's Perspective, ch. iii.

Mr. Kirby's instrument is seen in figs. 4, 5, 6. The ruler A B, fig 3, nineteen inches long, is graduated into nineteen equal parts; it has a dovetail groove on its upper edge to receive the perpendicular ruler G, which has one end fitted to it, so as to slide very easily; this ruler is fourteen inches long, and is divided into fourteen equal parts, and upon the back side of it F is a line drawn exactly in the middle, to which is fixed a silken line with a small plummet at the end. The ruler A B is fixed by two screws a, c,

to two pieces of thin brass; and these pieces of brass are fixed at the other ends by two screws *d*, *e*, to a stronger piece of brass *b f*, which goes close to the ruler A B, and has a joint at X turning upon a screw; below this joint is a piece of round brass about six inches long, which goes into a hole made in the top of the staff, and may be raised higher or lower, by means of a screw S: C D E represents part of this staff, the whole length of which is about three feet, and at the bottom is a rank screw made of iron and fixed to the staff. H I is a wire twenty-two inches long, with a screw at *h* to go into the hole *b*; the piece of brass wire bent into the form *i k* is fixed to the wire H I by the screw *k*; and the part *i* goes into the hole *f* in the brass piece *b f*. The small wire K L is about twelve inches long, and flatted at K, at which place is a little hole above one-eighth of an inch in diameter; this wire K L is fitted to the holes *l*, *m*, *n*, *o*, which are made in the larger wire H I, and it may be placed higher or lower by means of a small screw. This instrument is used in the following manner: fix a paper upon a drawing board, as in fig. 4, and divide the paper lengthways into nineteen equal parts, and perpendicularly into fourteen equal parts; making these divisions greater or smaller according to your design. Then take the staff, and fix it strongly in the ground by means of a screw at bottom, and at a convenient distance from the prospect which you intend to take.

Now put the instrument together as in fig. 5, and fix the ruler A B exactly horizontal by means of the plummet on the perpendicular ruler and the brass jo[redacted]he wire K L, so as to have the e[redacted]vel with the horizon or equal to the height of the eye, and take care to have the greatest distance of the eye-hole from the ruler equal to the whole length of the longest ruler A B, and never less than the distance *h l*. Having thus fixed the instrument, proceed to make the drawing; look through the eye-hole, and then move the perpendicular ruler in the groove, till you get one edge exactly against some principal object; then will the parts upon the ruler show how high the object is from the bottom of the ruler, i. e. from the bottom of the picture, and you will also know its apparent height; therefore transfer this to the paper in those squares which correspond with the divisions upon the rulers. For the breadth of objects, move the perpendicular ruler so as to be even with the sides of an object, and the divisions upon the lower ruler will show their apparent breadths. After the same manner, get the places and apparent sizes of as many principal objects as are necessary for assisting you, in completing the whole drawing, which may be done by this method with great exactness. When the drawing is finished, the instrument may be taken to pieces and put into a box, which may serve as a drawing board; the top M may be screwed into the staff, which will serve as a walking-stick, and the stool to sit on may be made very portable; so that every part of this apparatus may be carried by one person without any inconvenience. Kirby, b. ii. p. 65, &c. This last instrument has been found particularly convenient in taking views of extensive landscapes, or buildings.

PERSPICA'CIOUS, *adj.* } Lat. *perspicax*.
PERSPICAC'ITY, *n. s.* } Quicksighted; sharp of sight: quickness of sight.

He that laid the foundations of the earth cannot be excluded the secrecy of the mountains; nor can there any thing escape the *perspicacity* of those eyes which were before light, and in whose optics there is no opacity. *Browne.*

It is as nice and tender in feeling as it can be *perspicacious* and quick in seeing. *South.*

PE'RSPICIL, *n. s.* Lat. *perspicillum*. A glass through which things are viewed; an optic glass. Not used.

Let truth be
Ne'er so far distant, yet chronology,
Sharp-sighted as the eagle's eye, that can
Out-stare the broad-beamed day's meridian,
Will have a *perspicil* to find her out,
And through the night of error and dark doubt,
Discern the dawn of truth's eternal ray,
As when the rosy morn buds into day. *Crashaw.*

The *perspicil*, as well as the needle, hath enlarged the habitable world. *Glanville's Scepsis.*

PERSPIC'UOUS, *adj.* } Fr. *perspecuité*;
PERSPIC'UOUSLY, *adv.* } Lat. *perspicuus*.
PERSPIC'UOUSNESS, *n. s.* } Clear; translucent;
PERSPICU'ITY. } transparent; such as may be seen through; the adverb and noun substantive corresponding: perspicuity is more commonly used for clearness to the mind; and hence for precision of expression or language.

The purpose is *perspicuous* even as substance,
Whose grossness little characters sum up. *Shakspeare.*

The case is no sooner made than resolved; if it be made not enwrapped, but plainly and *perspicuously*. *Bacon.*

As contrary causes produce the like effects, so even the same proceed from black and white; for the clear and *perspicuous* body effecteth white, and that white a black. *Peacham.*

As for diaphaneity and *perspicuity*, it enjoyeth that most eminently, as having its earthy and salinous parts so exactly resolved that its body is left imporous. *Browne.*

The verses containing precepts have not so much need of ornament as of *perspicuity*. *Dryden.*

Perspicuity consists in the using of proper terms for the thoughts, which a man would have pass from his own mind into that of another. *Locke.*

All this is so *perspicuous*, so undeniable, that I need not be over industrious in the proof of it. *Sprat.*

PERSPIRE', *v. n.* Lat. *perspiro*. To perform excretion by the cuticular pores.

Hair cometh not upon the palms of the hands or soles of the feet, which are parts more *perspirable*; and children are not hairy, for that their skins are most *perspirable*. *Bacon.*

That this attraction is performed by effluviums, is plain and granted by most; for electricks will not commonly attract, unless they become *perspirable*. *Browne.*

Water, milk, whey, taken without much exercise; so as to make them *perspire*, relax the belly.
Arbuthnot.

In an animal under a course of hard labour, aliment too vaporous or *perspirable* will subject it to too strong a *perspiration*, debility, and sudden death.
Id. on Aliments.

Insensible *perspiration* is the last and most perfect action of animal digestion. *Id.*

How much more considerate this, than if the poet had, from an affected accuracy of description, thrown us into an unmannerly *perspiration* by the heat of the atmosphere; forced us into a landscape of his own planning, with perhaps a paltry good-for-nothing zephyr or two, and a limited quantity of wood and water. *Canning.*

PERSPIRATION, in medicine, is the evacuation of the juices of the body through the pores of the skin. Perspiration is distinguished into sensible and insensible; and here sensible perspiration is the same with sweating, and insensible perspiration that which escapes the notice of the senses. This last is the idea affixed to the word perspiration when used alone. The secretory organ is composed of the extremities of the cutaneous arteries. The smell of the perspirable fluid, in a healthy man, is fatuous and animal; its taste manifestly salt and ammoniacal. In consistence it is vaporous or aqueous; and its specific gravity in the latter state is greater than that of water. For the most part it is yellowish, from the passage of the subcutaneous oil, and sebaceous matter of the subcutaneous glands. Whatever form it takes, the liquid that escapes from the skin is composed, according to Thenard, of a great deal of water, a small quantity of acetic acid, of muriate of soda and potassa, a small quantity of earthy phosphate, an atom of oxide of iron, and a trace of animal matter. Berzelius considers the acid of sweat not the same as acetic acid, but like the lactic acid of Scheel. The skin exhales besides an oily matter, and some carbonic acid.

Experiments have been made to determine the quantity of transpiration which is formed in a given time, and the variations that this quantity undergoes according to circumstances. The first were those of Sanctorius, who, during thirty years, weighed every day, with extreme care, and an indefatigable patience, his food and his drink, his solid and liquid excretions, and even himself. Sanctorius arrived at no exact results. Since his time several philosophers and physicians have been employed on the same subject with more success; but the most remarkable labor in this way is that of Lavoisier and Seguin. These philosophers were the first who distinguished the loss that takes place by pulmonary transpiration from that of the skin.

Seguin shut himself up in a bag of gummed silk, tied above his head, and presenting an opening, the edges of which were fixed round his mouth by a mixture of turpentine and pitch. In this manner only the humor of the pulmonary transpiration passed into the air. In order to know the quantity, it was sufficient to weigh himself, with the bag, at the beginning and end of the experiment, in a very fine balance. By repeating the experiment out of the bag, he determined the whole quantity of humor transpired; so that, by deducting from this the quantity that he knew had passed out from the lungs, he had the quantity of humor exhaled by the skin. Besides, he took into account the food that he had used, his excretions solid and liquid, and generally all the causes that could have any influence upon the transpiration. By following this plan, the results of Lavoisier and Seguin are these:—1. The greatest quantity of insensible transpiration (the pulmonary included) is 25·6 grs. troy per minute; consequently 3 ozs. 1 drm. 36 grs. per hour; and 6 lbs. 4 ozs. 6 drms. 24 grs. in twenty-four hours. 2. The least considerable loss is 8·8 grs. per minute; consequently 2 lbs. 2 ozs. 3 drms. in twenty-four hours. 3. It is during the digestion that the loss of weight occasioned by insensible transpiration is at its minimum. 4. The transpiration is at its maximum immediately after dinner. 5. The mean of the insensible transpiration is 14·4 grs. per minute; in the mean 14·4 grs. 8·8 depend on cutaneous transpiration, and 5·6 upon the pulmonary. 6. The cutaneous transpiration alone varies during and after repasts. 7. Whatever quantity of food is taken, or whatever are the variations of the atmosphere, the same individual, after having augmented in weight by all the food that he has taken, returns, in twenty-four hours, to the same weight nearly that he was the day before, provided he is not growing, or has not eaten to excess.

The cutaneous transpiration has various uses. It keeps up the suppleness of the epidermis, and thus favors the exercise of the tact and the touch. It is by evaporation along with that of the lungs, the principal means of cooling, by which the body maintains itself within certain limits of temperature; also its expulsion from the economy appears very important, for every time that it is diminished or suspended, derangements of more or less consequence follow, and many diseases are not arrested until a considerable quantity of sweat is expelled.

It cannot be doubted that carbon is emitted from the skin; but in what state, the experiments hitherto made do not enable us to decide. Cruickshanks found that the air of the glass vessel in which his hand and foot had been confined for an hour, contained carbonic acid gas; for a candle burned dimly in it, and it rendered lime-water turbid. And Jurine, that air which had remained for some time in contact with the skin consisted almost entirely of carbonic acid gas. The same conclusion may be drawn from the experiments of Ingenhousz and Milly. Trousset has lately observed that air was separated copiously from a patient of his, while bathing.

The skin emits also a particular odorous substance. That every animal has a peculiar smell is well known: the dog can discover his master, and even trace him to a distance by the scent. Cruickshanks has made it probable that this matter is an oily substance, or at least that there is an oily substance emitted by the skin. He wore repeatedly, night and day, for a month, the same under waistcoat of fleecy hosiery, during the hottest part of the summer. At the end of this time he always found an oily substance accumulated in considerable masses on the nap

of the inner surface of the waistcoat, in the form of black tears. When rubbed on paper, it rendered it transparent, and hardened on it like grease. It burned with a white flame, and left behind it a charry residuum.

Berthollet has concluded that the acid which is present is the phosphoric; but this has not been proved. Fourcroy and Vauquelin have ascertained that the scurf which collects upon the skins of horses consists chiefly of phosphate of lime, and urea is even sometimes mixed with it. According to Thenard, however, the acid contained in sweat is the acetous; which, he likewise observes, is the only free acid contained in urine and in milk, this acid existing in both of them when quite fresh.

His account of his examination of it is as follows:—The sweat is more or less copious in different individuals; and its quantity is perceptibly in the inverse ratio of that of the urine. All other circumstances being similar, much more is produced during digestion than during repose. The maximum of its production appears to be twenty-six grains and two-thirds in a minute; the minimum nine grains, troy weight. It is much inferior, however, to the pulmonary transpiration; and there is likewise a great difference between their nature and manner of formation. The one is a product of a particular secretion, similar in some sort to that of the urine; the other, composed of a great deal of water and carbonic acid, is the product of a combustion gradually effected by the atmospheric air. The sweat, in a healthy state, very sensibly reddens litmus paper or infusion. In certain diseases, and particularly in putrid fevers, it is alkaline; yet its taste is always rather saline, and more similar to that of salt than acid. Though colorless, it stains linen. Its smell is peculiar, and insupportable when it is concentrated, which is the case in particular during distillation. But before he speaks of the trials to which he subjected it, and of which he had occasion for a great quantity, he describes the method he adopted for procuring it, which was similar to that of Cruickshanks. Human sweat, according to Thenard, is formed of a great deal of water, free acetous acid, muriate of soda, an atom of phosphate of lime and oxide of iron, and an inappreciable quantity of animal matter, which approaches much nearer to gelatin than to any other substance.

Perspiration varies in respect to, 1. *The temperature of the atmosphere*.—Thus men have a more copious, viscid, and higher-colored sweat in summer than in winter, and in warm countries, than in colder regions. 2. *Sex*.—The sweat of a man is said to smell more acrid than that of a woman. 3. *Age*.—The young are more subject to sweat than the aged, who, during the excessive heat of the summer, scarcely sweat at all. 4. *Ingesta*.—An alliacious sweat is perceived from eating garlick; a leguminous from peas; an acid from acids; a fetid from animal food only; and a rancid sweat from fat foods, as is observed in Greenland. A long abstinence from drink causes a more acrid and colored sweat; and the drinking a great quantity of cold water in summer a limpid and thin sweat. 5. *Medicines*.—The sweat of those who have taken musk, even moderately, and assafœtida, or sulphur, smells of their respective natures. 6. *Region of the body*.—The sweat of the head is greasy; on the forehead it is more aqueous; under the axillæ very unguinous; and in the interstices of the toes it is very fetid, forming in the most healthy man blackish sordes. 7. *Diseases*. In this respect it varies very much in regard to quantity, smell, and color; for the sweat of gouty persons is said to turn blue vegetable juices to a red color. Some men also have a lucid sweat, others a sweat tinging their linen of a cerulean color.

PERSUADE', *v. a.*
PERSUA'DER, *n. s.*
PERSUA'SIBLE, *adj.*
PERSUA'SIBLENESS, *n. s.*
PERSUA'SION, *n. s.*
PERSUA'SIVE, *adj.*
PERSUA'SIVELY, *adv.*
PERSUA'SIVENESS, *n. s.*
PERSUA'SORY, *adj.*

Fr. *persuader;* Span. and Port. *persuadir;* Ital. and Lat. *persuadere, persuadeo*. To induce; bring to an opinion; influence by expostulation or argument; inculcate by argument. Dr. Johnson says, 'persuasion seems rather applicable to the passions, and argument to the reason;' but this is not always observed: in an obsolete sense, to treat by persuasion: a persuader is one who thus treats or influences another; an officious adviser or importuner: persuasible is to be persuaded; the noun substantive that follows corresponding: persuasion is the act of persuading; state of being persuaded, or opinion to which one is persuaded: persuasive and persuasory, having the power to persuade or influence by argument; the adverb and noun substantive corresponding.

Let every man be fully *persuaded* in his own mind. *Romans.*

We are *persuaded* better things of you, and things that accompany salvation. *Hebrews* vi. 9.

Joy over them that are *persuaded* to salvation. *Esdras* vii.

They that were with Simon, being led with covetousness, were *persuaded* for money. 2 *Mac.* x.

Philoclea's beauty not only *persuaded*, but so *persuaded* as all hearts must yield: Pamela's beauty used violence, and such as no heart could resist. *Sidney.*

In prayer, we do not so much respect what precepts art delivereth, touching the method of *persuasive* utterance in the presence of great men, as what doth most avail to our own edification in piety and godly zeal. *Hooker.*

The most certain token of evident goodness is, if the general *persuasion* of all men does so account it. *Id.*

Twenty merchants have all *persuaded* with him;
But none can drive him from the envious plea
Of forfeiture. *Shakspeare.*

You are abused in too bold a *persuasion*. *Id.*

The earl, speaking in that imperious language wherein the king had written, did not irritate the people, but made them conceive, by the haughtiness of delivery of the king's errand, that himself was the author or principal *persuader* of that counsel. *Bacon.*

Let Martius resume his farther discourse, as well for the *persuasive* as for the consult, touching the means that may conduce unto the enterprize. *Id.*

He soon is moved
By such *persuaders* as are held upright. *Daniel.*

An opinion of the successfulness of the work being as necessary to found a purpose of undertaking it, as either the authority of commands, or the *persuasiveness* of promises, or pungency of menaces can be.
Hammond's Fundamentals.

To children, afraid of vain images, we *persuade* confidence by making them handle and look nearer such things. *Taylor.*

How incongruous would it be for a mathematician to *persuade* with eloquence, to use all imaginable insinuations and intreaties, that he might prevail with his hearers to believe that three and three make six! *Wilkins.*

Hunger and thirst at once,
Powerful *persuaders!* quickened at the scent
Of that alluring fruit, urged me so keen. *Milton.*
The serpent with me
Persuasively hath so prevailed, that I
Have also tasted. *Id.*

To sit cross-legged, or with our fingers pectinated, is accounted bad, and friends will *persuade* us from it. *Browne.*

Neither is this *persuasory.* *Id.*

If't prove thy fortune, Polydore, to conquer,
For thou hast all the arts of fine *persuasion,*
Trust me, and let me know thy love's success. *Otway.*

I should be glad, if I could *persuade* him to write such another critick on any thing of mine; for when he condemns any of my poems, he makes the world have a better opinion of them. *Dryden.*

Let a man be ever so well *persuaded* of the advantages of virtue, yet, till he hungers and thirsts after righteousness, his will will not be determined to any action in pursuit of this confessed great good. *Locke.*

Many who live upon their estates cannot so much as tell a story, much less speak clearly and *persuasively* in any business. *Id.*

The obedient and the men of practice shall ride upon those clouds, and triumph over their present imperfections; till *persuasion* pass into knowledge, and knowledge advance into assurance, and all come at length to be completed in the beatific vision. *South.*

Notwithstanding the weight and fitness of the arguments to *persuade,* and the light of man's intellect to meet this *persuasive* evidence with a suitable assent, no assent followed, nor were men thereby actually *persuaded.* *Id.*

It makes us apprehend our own interest in that obedience, makes us tractable and *persuasible,* contrary to that brutish stubbornness of the horse and mule, which the Psalmist reproaches.
Government of the Tongue.

When we have no other certainty of being in the right, but our own *persuasions* that we are so; this may often be but making one error the gage for another. *Id.*

Men should seriously *persuade* themselves, that they have here no abiding place, but are only in their passage to the heavenly Jerusalem. *Wake.*

Thus, a tune, a proverb, a scrap of poetry, or some other trivial object, will steal into the thoughts, and continue to possess them long after it ceases to be amusing. *Persuasives* to dismiss a guest that proves so troublesome, can hardly be necessary; and bodily exertion is generally the best remedy for this mental infirmity. *Percival.*

PERT, *adj.*, PERT'LY, PERT'NESS. } Welsh, *pert;* Belg. *pert;* Fr. *appert;* Qu. Lat. *paratus,* ready? Lively; brisk; smart; dapper: the adverb and noun substantive corresponding.

Awake the *pert* and nimble spirit of mirth;
Turn melancholy forth to funerals. *Shakspeare.*
Yonder walls, that *pertly* front your town,
Yond towers, whose wanton tops do buss the clouds,
Must kiss their own feet. *Id.*
On the tawny sands and shelves,
Tript the *pert* fairies and the dapper elves. *Milton.*
From *pert* to stupid sinks supinely down,
In youth a coxcomb, and in age a clown. *Spectator.*

A lady bids me in a very *pert* manner mind my own affairs, and not pretend to meddle with their linen. *Addison.*

All servants might challenge the same liberty, and grow *pert* upon their masters; and, when this sauciness became universal, what less mischief could be expected than an old Scythian rebellion?

When you *pertly* raise your snout,
Fleer, and gibe, and laugh, and flout;
This, among Hibernian asses,
For sheer wit and humour passes. *Swift.*

There is in Shaftesbury's works a lively *pertness* and a parade of literature; but it is hard that we should be bound to admire the reveries. *Watts.*

PERTAIN, *v. n.* Lat. *pertineo.* To belong; to relate; appertain.

As men hate those that affect that honour by ambition, which *pertaineth* not to them; so are they more odious, who through fear betray the glory which they have. *Hayward.*

A cheveron or rafter of an house, a very honourable bearing, is never seen in the coat of a king, because it *pertaineth* to a mechanical profession. *Peacham.*

PERTH, a town in Van Dieman's-land in Austral Asia, agreeably situated upon the banks of the South Esk river, twelve miles from Launceston. It is a military station, and in the vicinity are many excellent farms and substantial dwellings.

PERTH, a town of Austral Asia, in the division of New Holland. It is the chief town of the county of Perth, is situated upon the estuary of the Swan river, above the afflux of the Canning river, and in the capital of the district usually called the Swan river settlement.

PERTH, an ancient and celebrated city of Scotland, the capital of Perthshire, and formerly of the whole kingdom, is situated in a fine but low plain on the west bank of the Tay, which takes a bend to the east about a mile below the city. The waters of the Almond are also brought to the town by a canal. Portions of the plain north and south are called the North and South Inches, each of which is about a mile and a half in circumference, and is used both for the profit and pleasure of the inhabitants. On the north Inch is a good race ground.

The old part of the town is uniform in its plan, consisting of four streets from east to west, crossed by others at right angles. At the east end of High Street stood the old town house, county hall and prison, now rebuilding after a design by Smirke, on the site of the former palace of the Gowrie family. In the High Street is the guildhall, a plain building, and at the west end of it a modern church, with a steeple 140 feet high. In George Street is the public coffee room, also a handsome modern building. There are several other good halls in the city,

particularly that of the royal arch mason lodge, on the site of the ancient parliament house of Scotland. A little to the south and west of the new church is an old hospital, founded by James VI., now used as warehouses. Between the High Street and the South Street stands the church of St. John the Baptist, a building of very great antiquity, with a high spire, and is fitted up for three places of worship called the East, Middle, and West kirks. Chapels for the dissenters are also numerous. The episcopal chapel in Prince's Street is a very elegant building.

The whole of the Blackfriars ground on the north, and a considerable space of ground on the south side of the town, have within these twenty years been laid out for buildings, and a New Town may be then said to have arisen, containing a considerable number of streets, with many noble houses. Adjoining the North Inch is a crescent, place, and terrace, the latter a row of very fine buildings, in the centre of which is the Seminaries, a handsome fabric, where the various branches of education are taught. An elegant new theatre forms the western termination of the crescent, and a fine barrack terminates Athol Street in the same direction. At the extremity of South Inch stands a depôt, built by government for the reception of prisoners of war, now used for military stores. It is considered one of the most complete and well arranged establishments of this kind in Great Britain. Two banking companies belong to the town, and there is also a branch of the bank of Scotland, and another of the British Linen Company, established here. The grammar-school of Perth has long been accounted one of the best in Scotland, and has produced many eminent statesmen and scholars. A literary and antiquarian society has also been established.

Perth was only provided formerly with a wooden bridge over the Tay. This gave place in 1772 to a new one of stone, designed by Mr. Smeaton, and begun in 1766. It consists of ten arches, is 906 feet in length, and twenty-two in breadth, and was built at an expense of about £30,000. At the east end of the bridge is the bridge end or burgh of Kinnoul.

The salmon fishery on the Tay is very extensive, and the annual rent may be estimated at about £7000, of which Perth shares about £1000. The salmon are sent to London, packed in ice or pickled; a smack sailing every third or fourth day during the season. The staple manufacture of Perth is linen; but of late the cotton manufacture has greatly rivalled it. There are upwards of 2500 looms employed in the town, which manufacture linen and cotton goods, besides extensive manufactures of leather articles of all kinds. In the neighbourhood are various manufacturing villages, of which Tulloch, Craigee-mill, and Muirtoun of Dalhousie, are in the parish of Perth.

Perth is a royal borough, and joined with Dundee, Forfar, Cupar of Fife, and St. Andrews, in electing a representative in the British imperial parliament. It had a royal charter from king David I., who died in 1153, and which was renewed and confirmed by another from king William I. in 1210, which is still extant. It is governed by a provost, four bailies (viz. three merchants and one tradesman), a dean of guild, treasurer, and nineteen counsellors. It gave formerly the title of earl to the Drummond family, and the fourth earl was created duke of Perth, by James II. By clause 4, of the Scotch Reform Act, Perth alone is privileged to return one member to parliament.

Various accounts are given of the origin and ancient history of this place: some writers ascribing its first foundation to the Roman general Agricola; who is said to have fixed his camp here about A.D. 70, from the resemblance of the scenery to that of Rome. The soldiers when they first saw the river Tay, and the adjacent plain, are recorded to have exclaimed 'Ecce Tiber! Ecce Campus Martius!' Behold the Tiber! Behold the field of Mars! Hence the Tay, we are told, was called New Tiber, by the Italians; and Fordun, a Scottish historian, gives the name of Tyber-Mere, to an extensive moor west of the town. An aqueduct, said to have been constructed here by Agricola, is still in existence. When the town was fortified it supplied the ditches.

Necham, an English writer, who gave lectures on history at Paris in 1180, describes Perth as a place of opulence; and, in 1210, according to the Scottish historians, it was strongly fortified by king William, who renewed its charter, and granted many additional privileges to the city. At this time, and indeed until the reign of the Stuart family, Perth was reckoned the capital city of Scotland, when kings were crowned at Scone. Between the years 1201 and 1459 no fewer than fourteen parliaments were held here. It was then likewise, as it is still, an extensive commercial town. Fordun says that the merchants of Perth visited, in their own ships, the Hanse Towns.

The Flemings of this and the following century also frequented the port of Perth, and individuals of that nation connected with the linen and woollen manufactures appear to have fixed their abode in the town. King William, however, put the foreign merchants of Perth under restrictions; and, to prevent the settlement of foreign manufacturers there, granted in his charter that the burgesses might have a merchant guild of their own, 'fullers and weavers excepted.' Edward I. of England made it the residence of his deputies: Robert Bruce attacked this town in 1306 and 1311, but was repulsed on the former occasion by the earl of Pembroke; on the latter, after an obstinate siege of six weeks, he succeeded in storming the fortifications, which he levelled with the ground. After the battle of Duplin these were rebuilt by Edward Baliol. In 1335 our Edward III. took possession of Perth, and resided in it. John, earl of Cornwall, brother to that monarch, is said to have died here in October 1336; receiving, according to Fordun, his mortal wound from the king's own dagger. In 1339 Perth endured a long siege by the regent Robert, and was only taken by draining the ditch. In 1437 James I. of Scotland was murdered at the Black Friars' monastery by Robert Graham, who wounded him

in twenty-eight different places, and the queen twice. The king's wardrobe was long preserved in this town. At this period the town walls seem to have been in a state of demolition; as we find them repaired, at a very considerable expense, by James II. In his reign the earl of Gowrie's house here was the scene of one of the most remarkable events in Scottish history, i. e. the 'Gowrie conspiracy,' by John earl Ruthven, and his brother Alexander. These young men, according to the published account of the royal party, having prevailed upon the king to visit Perth (on the pretence of bringing to him a traitor whom they had taken), attempted to murder him; when his attendants slew them both; upon which the inhabitants of the town assembled round the house, threatening revenge, and they were with difficulty diverted from the purpose. In 1545 five men and a woman were burnt here for heresy. On the 11th of May, 1559, John Knox preached a sermon in the kirk against idolatry; and, by the indiscretion of a priest, a mob was raised, which destroyed all the monasteries and religious houses in the town. This year a select band of 300 reformers marched out of Perth to Stirling, with ropes about their necks, to hang the first that fled: and hence arose the phrase, 'St. Johnston's ribands.'

Perth, after the battle of Tibbermoor, was seized by the marquis of Montrose; and in 1651 was taken by Cromwell, who built a citadel on the South Inch. In 1715 the earl of Marr obtained possession of it, and occupied it for the Stuarts, till after the battle of Dunblane, on Sheriff-muir, when they were dislodged by the duke of Argyle. In 1745, also, prince Charles was proclaimed here, and appointed new magistrates.

Since this period Perth has greatly risen in importance: the civil wars were of considerable benefit to it, by inducing a number of the Commonwealth's soldiery to settle here; and the resort of the various respectable families who so long adhered to the Stuart race, and the passage of the conflicting forces, contributed also to increase and establish its trade.

Perth, or Perthshire, a county of Scotland, has the shire of Inverness and Aberdeen on the north; Angus or Forfar, Fife, and Kinross, on the east; Clackmannan and Stirling on the south; and Dunbarton and Argyle on the west; containing about 2638 square miles, of which fifty are occupied by lakes; or, in all, 1,688,320 English acres; being, next to Inverness-shire, the largest county of the mainland of Scotland. Its greatest extent, from east to west, is about seventy-seven miles, and from north to south sixty-eight.

Anciently it was divided into eight districts, containing seventy-nine parishes; Atholl, Stormont, Perth Proper, Gowrie, Strathearn, Monteith, Breadalbane, and Rannoch; and is under the jurisdiction of a sheriff, who has substitutes in the towns of Perth and Dunblane. The Highlands occupy about two-thirds of the surface: the Lowlands being chiefly situated on the eastern and southern extremities, which contain some of the richest tracts in Great Britain; and to the west, where the Grampians first rise, for almost the whole breadth of the county the high grounds are penetrated by straths and glens, of considerable extent, each traversed by its own streams, and diversified by numerous lakes. At least seven of these mountains are upwards of 3000 feet high: the highest being Benlawers, on the west side of Loch Tay; Benmore, south-west; and Schehallion, north-east. The following is a table of the principal elevations:—

Elevation.	Feet.
Dunsinnan Hill	1040
Kinseat Hill	1179
Demyet	1345
Tortum	1400
Birnam Hill	1580
Ben Clach (Ochil)	2420
Farragon	2584
Ben Chenzie (Strathearn)	2922
Ben Vorlich	3300
Ben Doig	3550
Ben Ledi	3009
Schichallion	3564
Ben Gload	3724
Ben More	3903
Ben Lawers	4015

The most considerable lakes are—Loch Tay, in the centre of the Highland district, about fifteen miles long, and one broad, with a depth varying from fifteen to 100 fathoms; Loch Ericht, on the north-west, extending into Inverness-shire, still longer, but not so broad; Loch Rannoch, south-east of the former, twelve miles long; Loch Earn, south from Loch Tay; and Lochs Vennachar, Achray, and Katrine, on the south-west. Most of the streams have their source in these lochs, or receive their waters as they pass them. The rivers are the Tay, Forth, Earn, Teath, and Isla; of which the two first are by far the largest. The Tay, the largest river in Scotland, has its source on the western border of Perthshire (to which county it is confined), under the name of the Dochart, and, soon after entering Loch Dochart, flows thence north-east till it falls into Loch Tay. Leaving Loch Tay, from which it now takes its name, it pursues first a north-easterly and then a southerly course to Dunkeld, from which it proceeds eastward, and then south, through a rich country, till it falls into the Frith of that name, a little below Perth; having been joined by the Almond and other streams in its course, which is not less than ninety miles. South of Loch Tay is Loch Earn, where the river of that name rises, and which, flowing east and south, through Strathearn and by the town of Crieff, after a course of twenty-four miles, falls, at Rhind, into the Frith of Tay. On the banks of this river, near its confluence with the Tay, is Pitcaithly, long celebrated for its mineral springs. There are also springs at Dunblane, which see.

In the central parts of this county the winters are stormy and severe; and, on the banks of the rivers, hoar-frosts are frequently very injurious in summer. On the east the climate is mild; and the thermometer, on an average of twelve years, has stood at 50°.

Perthshire has coal-mines at Culross, a small detached tract on the Forth; but, from the gene-

ral want of coal, limestone, which is found in many parts of the county, is of little value. Some years ago a machine was erected for pounding limestone for manure; but the experiment failed. In the higher grounds the prevailing rock is granite, and in the lower sandstone. On the southern ridges, or skirts of the mountains, both slate and freestone are found in abundance; but here the great sandstone stratum of Scotland terminates, in like manner as the coal field does to the southward of the Ochils. Hence it may be remarked that Perthshire contains within itself the boundary between the sandstone and the granite; for the former is only discovered in small patches to the north, and the latter seldom shows itself to the south, except in Galloway. What is curious, the secondary minerals on the ridges of the Grampians, such as slate, limestone, and even sandstone, seem to be affected in their properties by the proximity, or intermixture, of the primary rocks. Thus, below Murphy, in the parish of Little Dunkeld, is an inexhaustible body of a very fine grained freestone, which is of a light livid ash color, and so hard as to resist the action of the atmosphere for many centuries. The cathedral of Dunkeld was built of stones from this district, and fully corroborates the above assertion. In the hills of Birnam the slate is of a very deep blue color, bordering on violet; and the same is nearly the character of the limestone found at Rannoch, Glenlyon, Breadalbane, and the head of Strathearn. In Monteath is also a quarry of the same mineral, resembling marble, of a blue ground, with streaks of white. Iron stone appears in some parts; but no mines of that metal have ever been opened, except on the southern side of the Ochils, about Culross. A lead mine was wrought for many years near Tyndrum, in Breadalbane, as was likewise one in Glenlyon, but these are now both abandoned. Some lead ore was also discovered, about twenty years back, in the mountain of Ben-Ledi. One vein, on the north-east side of the mountain, was found to be extremely rich in silver, but its dimensions were too small to admit of its being wrought. In the hill of Birnam also several pieces of lead ore have been dug up. This ore was encrusted with a white sparry, or rather quartzose, substance; one piece, about six pounds in weight, consisted of unmixed compact ore, which produced a considerable portion of pure lead. It was found at the base of the hill.

Slates are abundant in different parts of the county. The principal stratum commences on the borders of Loch Lomond, in Dunbartonshire, and seems to terminate near Dunkeld. They are of two kinds, the blue and the gray slate. The former, which are by far the most valuable, are plentiful in Monteath, and along the north side of the Ochils. Gray slates also are found in vast quantities in the same districts, as well as in Strathallan and Strathearn. They consist of sandstone, which may be split into thin layers, six feet square; and are, since the introduction of blue slates in roofing, chiefly used for malt-kilns, floors, and pavement. In the parish of Wester Foulis is a blue slate quarry of great value; but it is not wrought to any very considerable extent, on account of its distance from water carriage. The best freestone quarries are those in the parish of Tulliallan on the Forth, and on the estate of Milnfield, in the south-eastern corner of the county. Shell-marl abounds in Stormont and Strathearn.

The alluvial soil on the banks of the rivers is in many parts of the richest quality, and of considerable extent. The Carse of Gowrie is a tract of about 18,000 acres, situated on the north and north-west banks of the Frith of Tay, and has long been celebrated for its orchards, of all sizes. Perthshire has red and fallow deer, and roes, rabbits, pigeons, and poultry; and abundance of the other game of the Highlands. It is much ornamented by the numerous seats of its proprietors, and has two royal burghs, Perth and Culross. Perth is a place of great antiquity, formerly the usual residence of the Scottish sovereigns, who were crowned at Scone in its vicinity, and the seat of parliaments and courts of justice. Some of the most important events in Scottish history, both of a religious and military description, occurred here. It is now a well built thriving town, containing, in 1811, about 17,000 inhabitants. About seventy other towns and villages are scattered over the county, the most considerable of which have been already described in the Encyclopædia.

The chief manufactures are linen, cotton, leather, and paper. As well as extensive bleachfields, print-fields, and cotton-mills, it has mills for extracting oil from seed, and for the spinning of flax and wool. The exports are corn, linen and linen-yarn, cottons, boots and shoes, salmon, and coals; and it imports lime in great quantities, some of the materials of its manufactures, and many domestic articles.

Perth, Articles of. The *five articles of Perth*, so called because they were carried by the influence of the court and bishops at a convention or assembly summoned to meet at Perth, August 25th, 1618, are as follow:—1. That the holy sacrament should be received kneeling. 2. That ministers should be obliged to administer the sacrament in private houses to the sick, if they desired it. 3. That ministers might baptise children privately at home, in cases of necessity, only certifying it to the congregation the next Lord's day. 4. That ministers should bring such children of their parish as could say their catechism, and repeat the Lord's prayer, creed, and ten commandments, to the bishops, that they might confirm them and give them their blessing. 5. That the festivals of Christmas, Easter, Whitsuntide, and the Ascension of our Saviour, should for the future be commemorated in the church of Scotland. The king ordered these articles to be published at the market-crosses of the several boroughs, and the ministers to read them in their pulpits; but most of the ministers refused, as they were sanctioned by no penalty except the king's displeasure. The king, however, determining to obtain the ratification of parliament, issued a proclamation, commanding all ministers who opposed them, and who were preparing a supplication against them, to leave the city of Edinburgh within twenty hours. The ministers obeyed,

leaving behind them a protestation against the articles, and an admonition to the members of parliament not to ratify them, as they would answer it in the day of judgment. The court interest prevailed, and the articles were ratified, contrary to the sense of the kirk and nation. This measure occasioned a persecution through the kingdom, and many of the Presbyterian ministers were fined, imprisoned, and banished by the high commission. Thus far the arbitrary and erudite James I. proceeded towards the restitution of episcopacy in Scotland; but there was still wanting for the completion of the work a public liturgy, or book of common prayer. An insurrection through the whole kingdom being apprehended, he desisted from enforcing this unwise measure, and left it to be finished by his son, whose imposition of it upon the kirk, without consent of parliament or general assembly, set fire to the discontents of the people, which had been gathering for so many years.

PERTINA'CIOUS, *adj.*
PERTINA'CIOUSLY, *adv.*
PERTINA'CIOUSNESS, *n. s.*
PERTINAC'ITY,
PER'TINACY.
Latin, *pertinax.* Obstinate; stubborn; stickling; used, however, in a good sense by South, or as meaning resolute; firm; constant: the adverb and noun substantive follow these senses: pertinacity and pertinacy also mean obstinacy; stubbornness; steadiness; see the extract from Taylor.

They deny that freedom to me which they *pertinaciously* challenge to themselves. *King Charles.*

Their *pertinacity* is such, that when you drive them out of one form, they assume another. *Duppa.*

St. Gorgonia prayed with passion and *pertinacy*, till she obtained relief. *Taylor.*

It (harsh speech) maketh them indocile and intractable, averse from better instruction, *pertinacious* in their opinions, and refractory in their ways. *Barrow.*

In this reply was included a very gross mistake, and, if with *pertinacity* maintained, a capital errour. *Browne.*

One of the dissenters appeared to Dr. Sanderson to be so bold, so troublesome and illogical in the dispute, as forced him to say, that he had never met with a man of more *pertinacious* confidence and less abilities. *Walton.*

Others have sought to ease themselves of all the evil of affliction by disputing subtily against it, and *pertinaciously* maintaining that afflictions are no real evils, but only in imagination. *Tillotson.*

It holds forth the *pertinacy* of ill fortune, in pursuing people into their graves. *L'Estrange.*

Metals *pertinaciously* resist all transmutation; and though one would think they were turned into a different substance, yet they do but as it were lurk under a vizard. *Ray.*

Diligence is a steady, constant, and *pertinacious* study, that naturally leads the soul into the knowledge of that which at first semed locked up from it. *South.*

PERTINENT, *adj.*
PER'TINENCE, *n. s.*
PER'TINENCY,
PER'TINENTLY, *adv.*
PER'TINENTNESS, *n. s.*
Fr. *pertinent;* Lat. *pertinens, pertineo.* Relative; apposite; exactly to purpose; relating; concerning: pertinence, pertinency, and pertinentness, mean appositeness; relevancy; justness of relation.

Men shall have just cause, when any thing *pertinent* unto faith and religion is doubted of, the more willing to incline their minds towards that which the sentence of so grave, wise and learned in that faculty shall judge most sound. *Hooker.*

My caution was more *pertinent*
Than the rebuke you give it.
Shakspeare. Coriolanus.

I set down, out of experience in business, and conversation in books, what I thought *pertinent* to this business. *Bacon.*

Here I shall seem a little to digress, but you will by and by find it *pertinent.* *Id.*

Be modest and reserved in the presence of thy betters, speaking little, answering *pertinently*, not interposing without leave or reason. *Taylor.*

Modest, sober, and *pertinent* discourse would appear far more generous and masculine, than such mad hectoring the Almighty, such boisterous insulting over the received laws and general notions of mankind. *Barrow on Vain Swearing.*

If he could find *pertinent* treatises of it in books, that would reach all the particulars of a man's behaviour; his own ill-fashioned example would spoil all. *Locke.*

I have shewn the fitness and *pertinency* of the apostle's discourse to the persons he addressed to, whereby it appeareth that he was no babbler, and did not talk at random. *Bentley.*

PERTINAX, an illustrious Roman emperor, who flourished about A. D. 170. He was descended of a mean family; and like his father, who was either a slave or the son of a slave, he for some time followed the employment of making charcoal. His poverty did not, however, prevent him from receiving a liberal education. For some time he was employed in teaching the Greek and the Roman languages in Etruria. He next became a soldier, and by his valor rose to the highest offices in the army, and was made consul by M. Aurelius. He was afterwards made governor of Mœsia, and at length of Rome itself. When Commodus was murdered, Pertinax was universally chosen to succeed to the imperial dignity. He complied with reluctance; but his mildness, his economy, and popularity, convinced the senate and people of the propriety of their choice. He forbad his name to be inscribed on any part of the imperial domains, insisting that they belonged not to him but to the public. He melted the silver statues which had been raised to Commodus, and sold all his concubines, horses, arms, and other instruments of his pleasure. With the money thus raised, he abolished all the taxes which that prince had imposed. These patriotic actions gained him the affection of the worthiest of his subjects; but, when he attempted to introduce among the pretorian guards proper discipline, the minds of the soldiers were totally alienated. Pertinax was apprized of their mutinying; but, instead of flying, he boldly addressed them; and they had begun to retire, when one of the most seditious advanced, and darting a javelin at his breast, exclaiming, 'The soldiers send you this.' The rest followed the bloody example; and Pertinax, muffling up his head, and calling upon Jupiter to avenge his death, was immediately despatched. This abominable murder happened A. D. 193. It was no sooner known than the enraged populace flocked from all

quarters, and uttering dreadful menaces against the authors of his death, ran up and down the streets in quest of them; but the senate had not the courage to avenge it. Such was the lamented end of Pertinax, after he had lived sixty-six years, seven months, and twenty-six days; and reigned, according to Dio Cassius, only eighty-seven days. His remains were interred with great pomp by Didius Julianus, his successor. Septimius Severus assumed the name of Pertinax, and punished with great severity all who had been accessory to his death; disbanded the Prætorian guards, pronounced his panegyric, and caused him to be ranked among the gods, appointing his son chief priest. The day of his accession and his birthday were celebrated for many years.

PERTUIS, in military affairs, a narrow passage which is made in the shallow parts of a river, for the facility of navigation. This passage is sometimes confined with flood-gates, in order to raise or lower the waters according to circumstances.

PERTUISANE, a halbert which has a longer and broader iron at the end than the common halberts have. They have been disused since the close of the seventh century.

PERTURB', *v. a.*
PERTUR'BATE, *v. a.*
PERTURBA'TION, *n. s.*
Lat. *perturbo.* To disquiet; to disturb; disorder; deprive of tranquillity: perturbation is disturbance; restlessness; disquiet; cause of disquiet. But we only find it in Shakspeare in this last sense.

His wasting flesh with anguish burns,
And his *perturbed* soul within him mourns. *Sandys.*

Rest, rest, *perturbed* spirit. *Shakspeare.*

O polished *perturbation!* golden care!
That keep'st the ports of slumber open wide,
To many a watchful night: sleep with it now,
Yet not so sound, and half so deeply sweet,
As he, whose brow with homely biggen bound,
Sleeps out the watch of night. *Id. Henry IV.*

Natures that have much heat, and great and violent desires and *perturbations*, are not ripe for action, till they have passed the meridian of their years. *Bacon's Essays.*

Restore yourselves unto your temper, fathers;
And, without *perturbation*, hear me speak. *Ben Jonson.*

They are content to suffer the penalties annexed, rather than *perturb* the public peace. *King Charles.*

Love was not in their looks, either to God,
Nor to each other; but apparent guilt,
And shame, and *perturbation*, and despair. *Milton.*

The inservient and brutal faculties controuled the suggestions of truth; pleasure and profit overswaying the instructions of honesty, and sensuality *perturbing* the reasonable commands of virtue. *Browne.*

The soul, as it is more immediately and strongly affected by this part, so doth it manifest all its passions and *perturbations* by it. *Ray.*

PERTU'SION, *n. s.* Lat. *pertusus.* The act of piercing or punching.

An empty pot without earth in it, may be put over a fruit the better, if some few *pertusions* be made in the pot. *Bacon.*

The manner of opening a vein in Hippocrates's time, was by stabbing or *pertusion*, as it is performed in horses. *Arbuthnot.*

PERTUSIS, chincough. See MEDICINE, Index.

PERU, once the largest of the Spanish vice-royalties in South America, is at present a small independent state, whose natural features, and much of whose political history we have already given in the article AMERICA, SOUTH.

We need only observe here that it is now generally considered as situated between 3° 25′ and 21° 30′ S. lat., and 65° and 81° 10′ W. long. It is bounded on the north by the republic of Columbia; east by Brasil; south by the desert of Atacama, which separates it from Chili, and by the United Provinces of South America; and west by the Pacific Ocean. Its mean length from north to south is about 750 miles, and its mean breadth about 660, the area being about 495,000. But the sinuosities of the shore are so considerable as to give a course of upwards of 1000 miles.

The Andes penetrate this territory from south-east to north-west nearly parallel with the coast, in three principal ridges or cordilleras, which continue till about 6° of S. lat., where they unite into a single chain. Along the whole coast or water side is a narrow plain, from thirty-five to seventy miles wide, called the country of Valles, consisting of a succession of barren sandy deserts. Immediately east of this is the lower or western ridge of the Andes, reaching the whole length of Peru; not in one unbroken elevation, like the cordillera of Mexico, but composed of successive summits of immense height, between which the eastern inhabitants find a laborious passage to the country of Valles. Between the western and central ridges there is a series of plains, varying in width from 100 to 170 miles, elevated generally 8000 or 10,000 feet above the level of the ocean, and separated from each other by deep valleys. The central cordillera consists also of separate summits, less broken than the western, and has an average height of 15,000 feet. Beyond the eastern cordillera there are immense unexplored plains, which reach into Brasil, and traversed from south to north by the principal mountain tributaries of the Amazon.

So far as the cultivation of the coast district has extended, it is powerfully aided by a species of manure peculiar to this part of Peru, and whose qualities seem to be derived from the singular circumstance of no rain falling here. On the islands, the resting-places of millions of aquatic birds, their dung has accumulated in the course of ages, so as to form hills of more than 100 feet in height, close to the shore, whence it is conveyed by small vessels to the main-land. The dung thus collected, not having its salts diluted by rain, and being but slightly affected by the sun, has retained, according to the analysis of Sir Humphry Davy, a greater proportion of ammonia than any substance that has yet been applied to land as manure. In this district most of the tropical fruits can be reared on the banks of the small streams, or assisted by artificial irrigation.

The sides of the Andes nearest the Pacific Ocean are covered with forests, made almost impenetrable by the numerous parasitical plants which twine round the trees. These forests yield acacias, mangle trees, arborescent brooms, and ferns; aloes and other succulent plants;

cedars, cotton, or Cuba trees of gigantic magnitude, and many kinds of ebony, and other useful woods.

The lofty plains between the Andes are perpetually verdant; and the grains, the vegetables, and fine fruits of Europe, flourish here amidst those of the torrid zone. Wine, oil, and sugar, are the most valuable productions of the coast; and corn, wheat, Peruvian bark, and cacao, of the high country.

The *rivers* on the west side of the Andes are mere mountain streams of short course; on the eastern side rise the Arragon and its tributaries.

The mountainous districts are of far-famed metallic wealth. Recently the number of gold mines and washings worked in Peru was sixty-nine, the number of silver mines 784, of quicksilver four, of copper four, and of lead twelve. The annual produce of the whole is valued at 4,500,000 dollars, of which silver constitutes seven-eighths. These rich mines, however, have always been under bad management, and their produce is hence very inferior to what it might be made. Those that are most productive are the mines of Pasco, in the province of Tarma. They are situated on a high table land, which rises more than 13,000 feet above the level of the sea, and were discovered in 1630, by Huari Capac, an Indian. The metalliferous bed is not far from the surface, as the pits are only from ninety to 400 feet deep. Water is then met with, and either occasions great expense to remove it, or causes the works to be abandoned. This mine was lately 15,747 feet long, and 7217 broad; and if worked by steam-engines, and according to the improved methods practised in Europe, it would be as productive as the celebrated mines of Guanaxuato in Mexico. The annual produce exceeds 131,000 lbs. troy. The mountain of Lauricocha, in which these mines are situated, is about six miles from Pasco, and contains an immense mass of fine porous brown iron-stone, which is interspersed throughout with pure silver, and yields eight or nine marks of the metal for every fifty hundred weight of the ore. There is also a rich vein of friable white metallic argil, which produces from two to ten pounds of silver for every hundred weight. The mines of Choco, in Truxillo, were discovered by Don Rodrigues de Ocano, a European, in 1771; but in the time of the incas the Peruvians obtained metal from this district. The mines in the Partido of Choco, which are included under the appellation of Gualgayoc, have sometimes supplied the provincial treasury of Truxillo with more than 44,000 lbs. troy of pure silver annually. These mines are richer than those of Potosi, and are situated at the height of 13,385 feet above the level of the Pacific Ocean. The mines of Huantajaya, in the partido of Arica, in a desert near the small port of Iquique, are famed for their large portion of native silver. Two pieces were not long since found, the one weighing two, and the other eight quintals. These mines are also surrounded by beds of rock-salt, and their whole annual produce of silver is from 42,000 lbs. to 52,000 lbs. troy. Immense wealth has likewise been discovered in several other places. At Pampa de Navar, wherever the turf is turned up, for more than half a square league, filaments of silver are found adhering to the roots of the grass, and sometimes large pieces of native metal appear. At present most of the Peruvian gold comes from Pataz and Huilies, in Tarmar, where it is met with in veins of quartz, traversing the primitive rock, and from the banks of the Maranon Alto, or higher Maranon, where it is procured by washing the alluvial soil. Emeralds and other precious stones are obtained in various places in this viceroyalty. The annual produce, as estimated from the royal revenues, between 1708 and 1789, was £768,424. The coinage of gold and silver in the royal mint at Lima, from 1791 to 1801, amounted to £1,113,000 per annum, of which 1726 lbs. were gold, and 285,000 lbs. silver.

Among the most valuable animals of these elevated regions are the llama, the guanuco, the vicuna, and the alpaco; which are considered as the camels of America, and are of great use both as beasts of burden, and for their wool.

In the country of Valles, included between the western cordillera and the coast, rain, thunder and lightning are entirely unknown. During the winter, however, which lasts from July to November, the ground is almost constantly covered with a thick fog, which, towards the close of the day, generally dissolves into a very small mist, or dew, and moistens the earth equably. During the summer the sun's rays occasion an intense heat throughout all this region; the more so as they are received upon a sandy soil, whence they are strongly reflected. This low region is far from being healthy; malignant, intermittent, and catarrhal fevers, pleurisies, and constipations, are the most common diseases, and rage constantly at Lima. A great part of Peru, between the western coast of the Andes and the shores of the Pacific, supplies one of the most perfect examples of what is called a hot and dry climate; as for the space of about 400 leagues along the coast, rain is wholly unknown. The Andes intercept the clouds, which pour their contents on the mountain districts, often accompanied by tremendous thunder and lightning, while near the sea not a drop falls to moisten the parched soil. The air in all this tract is, therefore, uniformly hot. During the winter at Lima, Fahrenheit's thermometer never sinks below 60°, and seldom rises above 85°. Vegetation flourishes to the height of 10,000 feet.

The elevated plains between the western and central cordillera, called by Humboldt the high table-land of Peru, has scarcely any variation of temperature throughout the year; the mercury of Fahrenheit's thermometer always standing at about 65° or 66°; the climate is here mild and genial. The only distinction of seasons arises from the rains, which prevail from November till May. The highest Andes are perpetually covered with snow, and experience an uninterrupted winter between the tropics. Here are also many volcanoes which are flaming within, while their summits and all their apertures are clothed with ice.

Peru labors under great disadvantages in regard to inland communication. The deep valleys which separate the elevated plains, and the lofty mountains which rise between the table-land and

the coast, render travelling difficult. In many parts there is a total want of roads as well as bridges, and in others the paths lie along the edges of steep and rugged precipices, so narrow that mules alone pass in security. In the most mountainous districts it is customary for those who can afford it to travel on the backs of Indians; in this way they are carried for fifteen or twenty days together. Nor is the Pacific Ocean here favorable to commerce. On the whole extent of its western coast there is no harbour except that of Callao, the port of Lima, which can be entered by a vessel of such a size as is fit for the navigation round Cape Horn. The wind blows constantly from the southward, varying only as the coast tends; wherever, therefore, there is a high projecting headland there is shelter, and sometimes good anchorage to the northward, as at Ylo, Iqueque, &c. But on every part of the shore the swell from the sea causes such a tremendous surf that no communication can be had with the shore by the boats of European ships. The natives pass this surf, on what is called a balsa, constructed of two skins of the largest sized seals, inflated and lashed side by side. The native sits on a small platform fixed between them, with a pipe made of the entrails of the seal, communicating air to each of the inflated skins as he finds it necessary. On these contrivances the natives fear no waves or breakers, and frequently proceed to such a distance as to lose sight of land: sometimes they add a paddle, and occasionally a small sail. Other vessels of this name are used for longer voyages, and consist of an unequal number of trees of light wood, squared, and lashed together, but so loosely as to admit the action of the waves between them. The centre tree is longer than the others, and serves the purpose of a prow. Some of these vessels are more than 100 feet in length, have huts constructed upon them for the crew, and pass with security from the shores of Peru to the ports of Guyaquil and Panama.

The native manufactures of Peru consist of homely articles, such as woollen and cotton cloths of inferior texture. But in dyeing the cloths, whether of woollen or cotton, the natives show ingenuity, and make use of plants scarcely known in Europe. They have a root called reilbon, resembling madder, but with a smaller leaf, an infusion of which makes a fine red. A plant called poquel, a kind of female southern-wood, with green chequered leaves, is used for yellow colors, as is also the stem for dyeing green. A wild indigo yields them a blue dye, and the panque a black. The dress of the natives is simple, consisting of a square cloth, with a hole in the centre, through which the head is thrust, and which falls before and behind. The head is generally covered with a large hat made of the straw of the maize.

The Peruvians were taught by their celebrated Manco to adore the Creator, whom they denominated Paca Camac, that intelligence which animated the world. They seldom built temples, or offered sacrifices to him. One temple, however, dedicated to a kind of unknown god, the Spaniards found at their arrival, erected in a valley, thence named the valley of Paca Ca . The sacrifices instituted in honor of the sun consisted chiefly of lambs; besides which they offered all sorts of cattle, fowls, and corn, and even burnt their finest cloths on the altar by way of incense. They had drink offerings made of maize, steeped in water. They also paid some kind of veneration to the images of several animals and vegetables that had a place in their temples. Besides the solemnities at every full moon, four grand festivals were celebrated annually. The first, called Raymi, was held in June, not only in honor of the sun, but of their first inca, Manca Capac, and Coya Mama Ocla, his wife and sister, whom the incas considered as their first parents, descended immediately from the sun. At this festival all the viceroys, generals, governors, and nobility, assembled at Cuzco, and the inca officiated in person as high-priest; though on other occasions the regular pontiff, who was usually the uncle or brother of the inca, officiated. On the morning of the festival, the inca, accompanied by his near relations, in order of their seniority, went barefoot in procession, at day-break, to the market-place, where they remained looking attentively towards the east. The luminary no sooner appeared than they fell prostrate on their faces in the most profound veneration, and acknowledged it to be their god and father. The vaisal princes and nobility, that were not of the blood royal, did the same in another square. The priests then offered a black lamb, in sacrifice, first turning its head towards the east. From the entrails of the victim they drew prognostics of peace and war, &c. The Peruvians believed in the immortality of the soul. The incas taught them that, on leaving this world, they should enter into a state of happiness, provided for them by their god and father the sun.

Before the arrival of the Spaniards the natives were acquainted with some points of astromomy. They had observed the various motions of the planet Venus, and the different phases of the moon. The people divided the year by the seasons; but the incas, who had discovered the revolution of the sun, marked out the summer and winter solstices by high towers, which they erected on the east and west of Cuzco. When the sun rose directly opposite to four of those towers, on the east side of the city, and set against those of the west, it was then the summer solstice; when it rose and set against the towers, it was the winter solstice. They had also erected marble pillars on the great court before the temple of the sun, by which they observed the equinoxes, under the equator, when the sun being vertical, the pillars cast no shade. At those times they crowned the pillars with garlands of flowers and odoriferous herbs, and celebrated a festival to the sun. They distinguished the months by the moon, and their weeks were called quarters of the moon; the days of the week they distinguished, as first, second, &c. When the sun was eclipsed, they concluded it was on account of their sins, imagining that this phenomenon portended famine, war, and pestilence, or some other terrible calamity. In a similar state of the moon, they apprehended that she was sick and dying.

They had philosophers, who taught morals, cultivated poetry, and composed plays, which were acted before the king by the great men of the court, officers, &c. They were acquainted with painting and statuary; but in all the implements of mechanic arts they were extremely deficient. Though many goldsmiths were constantly employed, they had never invented an anvil of any metal, but used a hard stone, and beat their plate with round pieces of copper instead of hammers; nor had they any files or graving tools. Their carpenters had no other tools than hatchets of copper or flint; nor had they learned the use of iron; though the country affords mines of it. Their knives were also made of flint or copper.

This country was first made known to Europe by the Spanish governor of Santa Maria, in Darien, Nunez de Balboa, who accidentally learned from a young cacique that there was a country abounding with gold about six days' journey to the south. Balboa set out, therefore, on the 1st day of September, 1513, about the time that the periodical rains began to abate. He had only 190 Spaniards along with him; but all of them were veterans, inured to the climate of America, and very much attached to their leader: 1000 Indians attended them, with their fierce dogs, to carry their provisions and other necessaries. After a painful journey of twenty-five days, Balboa arrived at the South Sea; when he went into it up to the middle, and took possession of the coast and ocean in the name of the king of Spain. That part of the South Sea he called the Gulf of St. Michael; a name it still retains. From some of the caciques he extorted provisions and gold; others sent him presents voluntarily. He now led back his followers to Santa Maria, to refresh them, and sent an account to the court of Spain of the important discovery he had made, demanding 1000 men to conquer the new country he had discovered. But the king appointed Pedrarias Davila to supersede him, with the command of fifteen stout vessels and 1200 soldiers. Balboa submitted to the king's pleasure, yet the new governor tried him for some pretended irregularities committed before his arrival, and fined him of almost all he was worth. In the mean time, the Spaniards, paying no regard to the treaties concluded by Balboa with the natives, plundered and destroyed them indiscriminately, from the gulf of Darien to lake Nicaragua. The new comers had also arrived about the middle of the wet season, when the excessive rains produced the most fatal diseases. To this was joined an extreme scarcity of provisions; so that in a month above 600 Spaniards perished. Balboa sent remonstrances to Spain against the new governor; on which the king appointed Balboa to supersede him with very extensive authority; enjoining Pedrarias to support him in all his enterprises. But though a reconciliation took place in appearance, so far that Pedrarias agreed to give his daughter in marriage to Balboa, he soon after had him condemned and executed on pretence of disloyalty. On the death of Balboa, further discoveries were laid aside for some time; but there were three persons at Panama who determined to go in quest of this country. These were Francis Pizarro, Diego de Almagro, and Hernand Luque. We have adverted already to the general history of their proceedings here, but some further particulars will gratify such of our readers as wish to understand the spirit of the Spanish conquests.

Pizarro and Almagro were soldiers of fortune, and Luque was an ecclesiastic, who acted at Panama as a priest and schoolmaster. Their confederacy was authorised by Pedrarias; and each engaged to employ his whole fortune in the adventure. Pizarro, being the least wealthy, engaged to take upon himself the greatest share of the fatigue and danger, and to command the armament. Almagro offered to conduct the supplies of provisions and reinforcements; and Luque was to remain at Panama, to superintend their general interests. In 1524 Pizarro set sail from Panama with a single vessel of small burden, and 112 men, selecting the most improper season of the whole year, i. e. when the periodical winds, which were then set in, were directly opposed to his course. The consequence was, that, after beating about for seventy days, with much danger and fatigue, he had advanced scarcely as far to the south-east as a skilful navigator will now make in three days. He touched at several places of Terra Firma, however, and at the Pearl Islands, where he was found by Almagro, who had set out in quest of him with a reinforcement of seventy men, and had suffered similar distresses. But the country of Popayan, showing a better aspect, and the inhabitants being more friendly, they determined not to abandon their scheme. Almagro returned to Panama, but the bad accounts of the service gave his countrymen such an unfavorable idea of it, that Almagro could levy only eighty men. The disasters and disappointments they met with, in this new attempt, were scarcely inferior to those they had already experienced, when part of the armament at last reached the bay of St. Matthew on the coast of Quito, and landed at Tacamez, where they met with a more fertile country than any they had yet seen; the natives also being more civilised, and clothed in cotton or woollen stuffs, adorned with gold and silver. But some of the adventurers had informed their friends of their many dangers and losses, which weighed so much with Peter de los Rios, the successor of Pedrarias, that he prohibited the raising of new recruits, and even despatched a vessel to bring home Pizarro and his companions from Gallo. Almagro and Luque advised Pizarro not to relinquish an enterprise on which they had built all their hopes. He therefore refused to obey the governor's orders, and entreated his men not to abandon him. But the calamities to which they had been exposed had such an effect, that when he drew a line upon the sand with his sword, telling such as wished to return, that they might pass over it, only thirteen remained with him. Pizarro with his little troop now fixed their residence on the island of Gorgona, where they continued five months, in the most unwholesome climate, when a vessel arrived from Panama, Almagro and Luque having prevailed on the governor to send them relief. He now therefore sailed to the south-east, and in twenty days landed on

the coast of Peru, at Tumbez, remarkable for its stately temple, and a palace of the incas or sovereigns of the country. Here they found the reports concerning the riches of the country were true; not only ornaments and sacred vessels being made of gold and silver, but even such as were for common use. Yet to attempt the conquest of this opulent empire with their slender force would have been madness; they contented themselves with viewing it, procuring two of the beasts called Llamas, some vessels of gold and silver, and two young men, whom they instructed in the Castilian language. With these Pizarro arrived at Panama in 1527.

Huana Capac, the twelfth monarch from the founder of the native empire, was at this time on the throne; a prince no less conspicuous for his abilities in war than for his pacific virtues. By him the kingdom of Quito was subdued, which almost doubled the extent of the Peruvian empire. Huana married the daughter of the conquered monarch, by whom he had a son named Atahualpa, or Atabalipa, to whom, at his death in 1529, he left the kingdom of Quito, bestowing the rest of his dominions on Huascar, his eldest son, by a mother of the royal race. This produced a civil war, in which Atabalipa proved victorious, and afterwards, to secure himself on the throne, put to death all the descendants of Manco; but he spared the life of his rival Huascar, who was taken prisoner, that, by issuing orders in his name, he might establish his own authority. This contest had now so much engaged the attention of the Peruvians, that, on the return of the Spaniards, they never attempted to check their progress. The first intelligence Pizarro received of it was a message from Huascar, asking his assistance against Atabalipa. Pizarro, therefore, determined to push forward, while intestine discord put it out of the power of the Peruvians to attack him with their whole force. Leaving a garrison in St. Michael, he began his march with only sixty-two horsemen, and 102 foot. He proceeded to Caxamalca, where Atabalipa was encamped, and was met by an officer with a valuable present from the Inca, accompanied with a proffer of his alliance. Pizarro pretended to come as the ambassador of a very powerful monarch, who wished to aid him against his enemies. As the object of the Spaniards in entering their country was otherwise altogether incomprehensible, the Peruvians had formed various conjectures concerning it. Pizarro's declarations of his pacific intentions, now, therefore, removed all the Inca's fears. The Spaniards were thus allowed to march across the sandy desert between St. Michael and Motupe, and through a defile in the mountains so narrow and inaccessible that a few men might have defended it. As they approached to Caxamalca, Atabalipa sent them presents of still greater value. On entering Caxamalca, Pizarro took possession of a large court, on one side of which was a palace of the Inca, and on the other a temple of the sun, surrounded with a strong rampart. When he had posted his troops in this advantageous station, he despatched Hernando Soto, and his brother Ferdinand, to the camp of the Inca, to desire an interview. Here they were treated with respectful hospitality, and Atabalipa promised to visit the Spanish commander next day. The decent deportment of the Peruvian monarch, the order of his court, and the reverence with which his subjects obeyed his commands, astonished the Spaniards. But their eyes were more powerfully attracted by the vast profusion of wealth which they observed. On their return to Caxamalca, they gave such a description of it as confirmed Pizarro in a resolution which he had already taken, as daring as it was perfidious. He determined to avail himself of Atabalipa's unsuspicious simplicity, to seize his person. Dividing his cavalry, therefore, into three squadrons, under his brothers Ferdinand, Soto, and Benalcazzar; and forming the infantry into one body, except twenty of most tried courage, whom he kept near his own person; he placed his artillery, consisting of two field-pieces, and the cross-bow men, opposite to the avenue by which Atabalipa was to approach. Early in the morning, the Peruvian camp was in motion. But as Atabalipa was solicitous to appear with the greatest splendor and magnificence in his first interview with the strangers, the day was far advanced before he began his march. At length the inca approached. First appeared 400 men in uniform, as harbingers. He himself sitting on a throne, almost covered with gold, silver, and precious stones, was carried on the shoulders of his principal attendants. Behind him came his chief officers. Several bands of singers and dancers accompanied the cavalcade; and the whole plain was covered with troops, amounting to about 30,000 men. As the inca drew near the Spanish quarters, father Vincent Valverede, chaplain to the expedition, advanced with a crucifix in one hand, and a breviary in the other, and in a long discourse pretended to announce the true doctrine of the creation, the fall of Adam, the incarnation, the sufferings and resurrection of Jesus Christ, the appointment of St. Peter as God's vicegerent on earth, the transmission of his apostolic power by succession to the popes, and the donation made to the king of Castile by pope Alexander of all the regions in the New World. In conclusion he required Atabalipa to embrace the Christian faith, to acknowledge the jurisdiction of the pope, and to submit to the king of Castile as his lawful sovereign; promising, if he complied, that the Castilian monarch would protect his dominions, and permit him to continue in his authority; but, if he should impiously refuse to obey this summons, he denounced war against him in his master's name. This strange harangue, unfolding deep mysteries, and alluding to unknown facts, of which no power of eloquence could have conveyed a distinct idea to an American, was so lamely translated by an unskilful interpreter, that it was incomprehensible to Atabalipa. But some parts in it, of obvious meaning, filled him with astonishment and indignation. His reply, however, was temperate. He said that he was lord of his own dominions by hereditary right; that he could not conceive how a foreign priest should pretend to dispose of territories which did not belong to him: that he, being the rightful possessor, refused to con-

firm it; that he would not forsake the service of the Sun, the immortal divinity whom he revered, to worship the God of the Spaniards, who was subject to death; that with respect to other matters, as he had never heard of them before, he desired to know where he had learned things so extraordinary. 'In this book,' answered Valverede, reaching out to him his breviary. The inca opened it, and turning over the leaves, lifted it to his ear: 'This,' says he, 'is silent; it tells me nothing;' and threw it with disdain to the ground. The enraged monk, running to his countrymen, cried out, 'To arms, Christians, to arms! the word of God is insulted! avenge this profanation on these impious dogs.' Pizarro immediately gave the signal of assault. At once the martial music struck up, the cannon and muskets began to fire, the horse sallied out fiercely, the infantry rushed on, sword in hand. The Peruvians, astonished at the unexpected attack, fled with universal consternation, without attempting to defend themselves. Pizarro, at the head of his chosen band, advanced directly towards the inca; and though his nobles crowded around him with zeal, and fell in numbers at his feet, the Spaniards soon penetrated to the royal seat; and Pizarro, seizing the inca by the arm, dragged him to the ground, and carried him a prisoner to his quarters. The fate of the monarch increased the precipitate flight of his followers. The Spaniards pursued them towards every quarter, and, with deliberate and unrelenting barbarity, continued to slaughter the wretched unresisting fugitives. Above 4000 Peruvians were killed. Not a single Spaniard fell, we are told, nor was one wounded but Pizarro himself slightly. The plunder taken was immense, but the Spaniards were still unsatisfied; which being observed by the inca, he endeavoured to apply himself to their ruling passion, avarice, to obtain his liberty; and, therefore, offered such a ransom as quite astonished them. The apartment in which he was confined was twenty-two feet in length, and sixteen in breadth; all this space he engaged to fill with vessels of gold as high as he could reach. The proposal was eagerly caught by Pizzaro, and a line was drawn upon the walls to mark the stipulated height.

Atabalipa, anxious for his liberty, immediately despatched messengers into all parts of the empire, to collect the quantity of gold which he had promised; and, though the unfortunate monarch was now in the hands of his enemies, such was the veneration which his subjects had for him, that his orders were obeyed with as great alacrity as if he had been at full liberty. In a short time Pizarro received intelligence that Almagro was arrived at St. Michael with a reinforcement. This was a matter of no small vexation to Atabalipa, who now considered his kingdom as in danger of being totally overrun by these strangers. For this reason he ordered his brother Huascar to be put to death, lest he should join against him. In the mean time, the Indians daily arrived at Caxamalca with vast quantities of treasure; the sight of which so much inflamed the Spaniards, that they insisted upon an immediate division: and this being complied with, there fell to the share of each horseman 8000 pesos, worth as many pounds sterling, and half as much to each foot soldier, Pizarro and his officers receiving shares proportionable to their dignity. A fifth part was reserved for the emperor, together with some vessels of curious workmanship. After this, Atabalipa was very importunate with Pizarro to recover his liberty; but the Spaniard, with unparalleled treachery and cruelty, had now determined to put him to death. But, to give some show of justice to this detestable action, Pizarro instituted a court of judicature for trying him. He appointed himself and Almagro, with two assistants, as judges; an attorney-general to carry on the prosecution in the king's name; counsellors to assist the prisoner in his defence; and clerks to record the proceedings. Before this strange tribunal, a charge was exhibited still more amazing. That Atabalipa, though a bastard, had usurped the royal power; that he had put his brother and lawful sovereign to death; that he was an idolater, and had offered up human sacrifices; that he had a great number of concubines, &c. On these heads they proceeded to try the sovereign of a great empire, over whom they had no jurisdiction. To all these charges the inca pleaded not guilty. He called heaven and earth to witness the integrity of his conduct, and how faithfully he performed his engagements, and the perfidity of his accusers. He desired to be sent over to Spain, to take his trial before the emperor; but no regard was paid to his entreaties. He was condemned to be burnt alive; which cruel sentence was mitigated to strangling; and the unhappy monarch was executed without mercy. Hideous cries were set up by his women as the funeral procession passed by their apartment; many offered to bury themselves alive with him; and, on being hindered, strangled themselves out of grief. The whole town of Caxamalca was filled with lamentations, which quickly extended over the whole kingdom.

Yet this murder of Atabalipa did no service to the Spaniards. Friends and enemies accused them of inhumanity and treachery. Loads of gold that were coming to Caxamalca by order of the deceased inca were now stopped; this was the first consequence of their late iniquitous conduct. The two factions of Indians also united against Pizarro; and many of the Spaniards not only exclaimed against the cruelty of the judges, but would even have mutinied, had not a sense of the impending danger kept them quiet. At Cuzco the friends of Huascar proclaimed Mango Capac, the legitimate brother of the late inca: on which Pizarro set up Taparpa, the son of Atabalipa. Immediately he set out for Cuzco. An army of Indians opposed his progress, but the Spanish cavalry bore down every thing before them. The conquerors gained a great booty; and Pizarro despatched Almagro to reduce Cuzco, while he himself founded a new colony in Xauna. Ferdinand Soto was detached with sixty horse to Cuzco, to clear the road for the remainder of the army. Meantime Taparpa died; and, as the Spaniards set up no person in his room, the title of Manco Capac

was universally acknowledged. A new supply of soldiers arriving from Spain, Benalcazar, governor of St. Michael, undertook an expedition against Quito, where Atabalipa had left the greatest part of his treasure. He accomplished his purpose with difficulty, but found that the inhabitants had carried off all their gold and silver. About the same time Alvarado, governor of Guatimala, invaded Chili. In this expedition his troops endured such hardships, and suffered so much from the cold among the Andes, that a fifth part of the men and all the horses died, and the rest were so much dispirited and emaciated that they became quite unfit for service. Alvarado then returned to his government, but most of his followers enlisted under Pizarro. In the mean time Ferdinand Pizarro had landed in Spain, where he produced such immense quantities of gold and silver as astonished the court. The general's authority was confirmed with new powers; Almagro had the title of governor conferred upon him, with jurisdiction over 200 leagues of a country lying south of the province allotted to Pizarro. Pizarro then settled the internal policy of his province, and removed the seat of government from Cuzco to Lima.

Meantime Almagro had set out on his expedition to Chili. Pizarro encouraged his most distinguished officers to invade those provinces which had not yet been visited by the Spaniards. No sooner did Manco Capac perceive the Spaniards thus dividing their forces, than he seized the opportunity of making one vigorous effort to redress the wrongs of his countrymen, and expel the cruel invaders. Though strictly guarded by the Spaniards, he found means to communicate his intentions to the chief men of his nation, whom he joined in 1536, under pretence of celebrating a festival which he had obtained liberty from Pizarro to attend. Upon this an army of 200,000 men collected. Many Spaniards were massacred, and several detachments cut off: while this vast army laid siege to Cuzco, another formidable body invested Lima, and kept the governor shut up. The greatest effort, however, was made agaist Cuzco, which was defended by Pizarro and his two brothers, with only 170 men. The siege lasted nine months; many Spaniards were killed; among whom was John Pizarro, the general's brother. The rest were reduced to the most desperate situation, when Almagro appeared near Cuzco. He had now received the royal patent, creating him governor of Chili. On his arrival, his assistance was solicited by both parties. The inca made many advantageous proposals; but at length attacked him in the night by surprise. But the Spanish valor and discipline prevailed, and the Peruvians were repulsed with such slaughter that the remainder dispersed, and Almagro advanced to Cuzco. Pizarro's brother took measures to oppose his entrance; but, while prudence restrained both parties from entering into a civil war, each leader endeavoured to corrupt the followers of his antagonist. In this Almagro had the advantage; and so many of Pizarro's troops deserted in the night that Almagro was encouraged to advance towards the city, where he surprised the sentinels; and, investing the *house where the two brothers were lodged, he compelled them, after an obstinate defence, to surrender. Almagro's authority over Cuzco was now immediately recognised. But Francis* Pizarro having dispersed the Peruvians who invested Lima, and received considerable reinforcements from other provinces, ordered 500 men, under Alonso de Alvarado, to march to Cuzco to relieve his brothers. Almagro attacked him by surprise, defeated and dispersed his army, taking himself and some of his principal officers prisoners. This victory seemed decisive; and Almagro was advised to make it so by putting to death Gonzalo and Ferdinand Pizarro, and Alvarado. This advice, however, he declined from humanity; and, instead of marching directly against Pizarro, he retired to Cuzco, which gave his adversary time to recollect himself, and Almagro again suffered himself to be deceived by pretended offers of pacification. The negociations were protracted for several months; Gonzalo Pizarro and Alvarado bribed the soldiers who guarded them, and escaped with sixty of Almagro's men. The general next proposed that all disputes should be submitted to their sovereign; and, on this principle, Almagro released those whom Pizarro wanted; which he had no sooner done, than the latter set out for Cuzco with an army of 700 men, to which Almagro had only 500 to oppose. He advanced without obstruction, and an engagement soon followed, in which Almagro was defeated and taken prisoner. The conquerors behaved with great cruelty, massacring a great number of officers. The Indians had assembled in great numbers to see the battle, with an intention to join the vanquished; but were so much overawed by the Spaniards that they retired after the battle was over, and thus lost the only opportunity they ever had of expelling their tyrants.

Almagro was at length tried and condemned by Pizarro; and he was first strangled in prison, and then beheaded. He left one son by an Indian woman, whom he appointed his successor. As during these dissensions all intercourse with Spain ceased, it was some time before the accounts of the civil war were received at court. The first intelligence was given by some of Almagro's soldiers, who had left America on the ruin of their cause; and they did not fail to represent the injustice and violence of Pizarro in their proper colors, which strongly prejudiced the emperor against him. In a short time, however, Ferdinand Pizarro arrived, and endeavoured to give matters a new turn. The emperor was uncertain which of them to believe, but resolved to send over one he could trust to investigate the matter. Meantime Ferdinand was arrested at Madrid, and confined to prison, where he remained twenty years. The person nominated to this important trust was Christopher Vaca Di Castro. While Di Castro was preparing for his voyage, Pizarro, considering himself as the unrivalled master of Peru, proceeded to parcel out its territories among the conquerors; and, had this division been made with any degree of impartiality, the extent of country which he had to bestow was sufficient to have gratified his friends, and to have gained his ene-

mies. But Pizarro conducted this transaction with the illiberal spirit of a party-leader. Large districts, in parts of the country most cultivated and populous, were set apart as his own property, or granted to his brothers, his adherents and favorites. To others, lots less valuable and inviting were assigned. The followers of Almagro, amongst whom were many of the original adventurers to whose valor Pizarro was indebted for his success, were totally excluded. They therefore murmured in secret, and meditated revenge.

Rapid as the progress of the Spaniards in South America had been since Pizarro landed in Peru, their avidity of dominion was not yet satiated. The officers to whom Ferdinand Pizarro gave the command of different detachments penetrated into several new provinces; and though exposed to great hardships in the cold regions of the Andes, and amidst the woods and marshes, they made considerable discoveries and conquests. Peter de Valdivia re-assumed Almagro's scheme of invading Chili; and made such progress in the conquest of the country, hat he founded the city of St. Jago. But the enterprise of Gonzales Pizarro was the most remarkable. He set out from Quito at the head of 340 soldiers, nearly one-half of whom were horsemen, with 4000 Indians. Excess of cold and fatigue proved fatal to the greater part of these last. The Spaniards, though more robust, suffered considerably; but, when they descended into the low country, their distress increased. During two months it rained incessantly, without any interval of fair weather to dry their clothes. The vast plains upon which they were now entering, either without inhabitants, or occupied by the rudest and least industrious tribes in the New World, yielded little subsistence. They could not advance a step but through woods or marches. Such incessant toil, and scarcity of food, would have dispirited any troops. But the fortitude and perseverance of the Spaniards were insuperable. They persisted in struggling on, until they reached the banks of the Napo, one of the large rivers which run into the Maragnon. There, with infinite labor, they built a bark, which was manned with fifty soldiers, under Francis Orellana. The stream carried them down with such rapidity that they were soon far a-head of their countrymen, who followed slowly by land. At this distance from his commander, Orellana formed the scheme of distinguishing himself, by following the course of the Maragnon until it joined the ocean, and by surveying the vast regions through which it flows. This scheme was as bold as it was treacherous. For, if he violated his duty to his commander, and abandoned his fellow soldiers in a pathless desert, his crime is somewhat balanced by the glory of having ventured upon a navigation of nearly 2000 leagues, through unknown nations, in a vessel hastily constructed with green timber, and by very unskilful hands, without provisons, without a compass, or a pilot. But his courage and alacrity supplied every defect. Committing himself fearlessly to the guidance of the stream, the Napo bore him along to the south until he reached the great channel of the Maragnon. He sometimes seized by force the provisions of the fierce savages seated on its banks, and sometimes procured a supply of food by a friendly intercourse. After a long series of dangers and distresses, which he encountered with amazing magnanimity, he reached the ocean, where new perils awaited him. These he likewise surmounted, and got safe to the Spanish settlements in the island of Cubagua; whence he sailed to Spain.

The vanity natural to travellers who visit regions unknown to the rest of mankind prompted him to mingle an extraordinary proportion of the marvellous in the narrative of his voyage. He pretended to have discovered nations so rich that the roofs of their temples were covered with plates of gold; and described a republic of Amazons so warlike and powerful as to have extended their dominion over a considerable tract of the fertile plains which he had visited; fables hardly yet exploded. The voyage, however, deserves to be recorded, not only as one of the most memorable occurrences in that adventurous age, but as the first event that led to any certain knowledge of those immense regions that stretch east from the Andes to the ocean. No words can describe the consternation of Pizarro, when he did not find the bark at the confluence of the Napo and Maragnon, where he had ordered Orellana to wait for him. But, imputing his absense from the place of rendezvous to some unknown accident, he advanced above fifty leagues along the banks of the Maragnon, expecting every moment to see the bark appear with a supply of provisions. At length he came up with an officer whom Orellana had left to perish in the desert, because he had remonstrated against his perfidy. From him he learned the extent of Orellana's crime; and his followers perceived at once their own desperate situation. The spirit of the stoutest hearted veteran sank within him; and all demanded to be led back instantly. Pizarro was now 1200 miles from Quito; and in that long march the Spaniards encountered hardships greater than those they had endured in their progress outward. Hunger compelled them to feed on roots and berries, to eat all their dogs and horses, to devour the most loathsome reptiles, and even to gnaw the leather of their saddles and sword belts: 4000 Indians, and 210 Spaniards, perished in this wild and disastrous expedition, which continued nearly two years; and, as fifty men were aboard the bark with Orellana, only eighty got back to Quito. These were naked like savages, and so emaciated with famine or worn out with fatigue, that they had more the appearance of spectres than of men. But Pizarro, on entering Quito, received accounts of a state of things that threatened calamities more dreadful than those through which he had passed. From the time that his brother made the partial division of his conquests above-mentioned, the adherents of Almagro no longer entertained any hope of bettering their condition. Great numbers in despair resorted to Lima, where the house of young Almagro was always open to them: and the slender portion of his father's fortune, which he enjoyed, was spent in affording them subsistence. The warm attachment with which

every person who had served under the elder Almagro devoted himself to his interests, was transferred to his son, who was now grown up to manhood, and possessed all the qualities which captivate the affections of soldiers. Of a graceful appearance, dexterous at all martial exercises, bold, open, generous, he seemed to be formed for command; and the accomplishments he had acquired heightened the respect of his followers. The Almagrians, looking up to him as their head, were ready to undertake any thing for his advancement. Nor was affection for Almagro their only incitement; they were urged on by their own distresses. Many of them, destitute of common necessaries, and weary of loitering away life, a burden to their chief, began to deliberate how they might be avenged on the author of all their misery. Their frequent cabals did not pass unobserved; and the governor was warned to be on his guard against men who meditated some desperate deed, and had resolution to execute it. But either from his native intrepidity, or from contempt of persons whose poverty rendered their machinations of little consequence, he disregarded the admonitions of his friends. This gave the Almagrians full leisure to digest and ripen their scheme; and John de Herrada, an officer of great abilities, who had the charge of Almagro's education, took the lead in their consultations. On Sunday the 26th of June, at mid-day, Herrada, at the head of eighteen of the most determined conspirators, sallied out of Almagro's house in armour; and drawing their swords, as they advanced hastily towards the governor's palace, cried out, 'Long live the king, but let the tyrant die.' Though Pizarro was usually surrounded by a numerous train of attendants, yet, as he was just risen from table, and most of his domestics had retired to their own apartments, the conspirators were at the bottom of the staircase before a page in waiting could give the alarm. The governor, whom no form of danger could appal, starting up, called for arms, and commanded Francis de Chaves to make fast the door. But that officer, running to the top of the staircase, wildly asked the conspirators what they meant? Instead of answering, they stabbed him to the heart, and burst into the hall. A few, drawing their swords, followed Pizarro into an inner apartment. The conspirators rushed forward after them. Pizarro, with no other arms than his sword and buckler, defended the entry, and, supported by his half-brother Alcantara and his friends, maintained the unequal contest with the vigor of a youthful combatant. But the armor of the conspirators protected them, while every thrust they made took effect. Alcantara fell dead at his brother's feet; his other defendants were mortally wounded; and the governor, no longer able to parry the many weapons furiously aimed at him, received a deadly thrust full in his throat, sunk, and expired. As soon as he was slain, the assassins ran out into the streets, and waving their bloody swords, proclaimed the death of the tyrant. Above 200 of their associates having joined them, they conducted young Almagro in solemn procession through the city; and, assembling the magistrates and principal citizens, compelled them to acknowledge him as lawful successor to his father in his government. The palace of Pizarro, and the houses of his adherents, were pillaged by the soldiers. The new governor marched into the heart of the empire to reduce such places as refused to acknowledge his authority. A multitude of ruffians joined him on his march. His army breathed nothing but vengeance and plunder; every thing gave way before it. If the military talents of the general had equalled the ardor of his troops, the war had ended here. Unhappily for Almagro, he had lost his conductor John de Herrada. His inexperience made him fall into the snares that were laid for him by Peter Alvares, who had put himself at the head of the opposite party. In the mean time, Vaca Di Castro, who had been sent from Europe to try the murderers of old Almagro, arrived at Peru. As he was appointed to assume the government in case Pizarro was no more, all who had not sold themselves to the tyrant, hastened to acknowledge him. Castro instantly led them against the enemy. The armies engaged at Chapas on the 16th of September, 1542, and fought with inexpressible obstinacy. Victory decided in favor of Castro. Those among the rebels who were most guilty, dreading tortures, provoked the conquerors to murder them, crying out, It was I who killed Pizarro. Their chief was taken prisoner and died on the scaffold.

While these scenes of horror were transacting in America, the Spaniards in Europe were employed in finding out expedients to terminate them; though no measures had been taken to prevent them. Peru had only been made subject to the audience of Panama, which was too remote. A supreme tribunal was established at Lima for the dispensation of justice, with authority to enforce and reward a due obedience to the laws. Blasco Nunez Vela, who presided in it as viceroy, arrived in 1544, attended by his subordinates in office, and found every thing in the most dreadful disorder. To put an end to the tumults which now subsisted would have required a profound genius, and many other qualities which are seldom united. Nunez had none of these advantages. He indeed possessed probity, firmness, and ardor. With these virtues, which were almost defects in his situation, he began to fulfil his commission, without regard to places, persons, or circumstances. Contrary to the opinion of all intelligent persons, who wished that he should wait for fresh instructions from Europe, he published ordinances, which declared that the lands the conquerors had seized should not pass to their descendants, and which dispossessed those who had taken part in the civil commotions. All the Peruvians who had been enslaved by monks, bishops, and persons belonging to the government were declared free. Other tyrannical establishments also would soon have been proscribed; and the conquered people were on the eve of being sheltered under the protection of laws which would at least have tempered the rigors of the right of conquest, if even they had not entirely repaired the injustice of them; but the Spanish government was to be unfortunate even in the good it attempted to effect. A change so unexpected filled those with consternation who saw their fortunes thus

wrested from them. From astonishment they proceeded to indignation, murmuring, and sedition. The viceroy was degraded, put in irons, and banished to a desert island, till he could be conveyed to Spain. Gonzales Pizarro was then returned from his hazardous expedition, which had employed him long enough to prevent him from taking a part in those revolutions which had so rapidly succeeded each other. The anarchy he found prevailing at his return inspired him with the idea of seizing the supreme authority. His fame and his forces made it impossible that this should be refused him; but his usurpation was marked with so many enormities that Nunez was regretted. He was recalled from exile, and soon collected a sufficient number of forces to enable him to take the field. Civil commotions were then renewed with extreme fury by both parties. No quarter was asked or given on either side. The Indians took part in this as they had done in the preceding wars; some ranged themselves under the standard of the viceroy, others under the banners of Gonzales. From 15,000 to 20,000 of these unhappy wretches, who were scattered about in each army, dragged up the artillery, levelled the roads, carried the baggage, and destroyed one another. Their conquerors had taught them to be sanguinary. After a variety of advantages for a long time alternately obtained, fortune at length favored the rebellion under the walls of Quito, in January, 1545; and Nunez with the greatest part of his men were massacred. Pizarro took the road of Lima, where they were deliberating on the ceremonies with which they should receive him. Gonzales contented himself with making his entrance on horseback, preceded by his lieutenant, who marched on foot. Four bishops and the magistrates accompanied him. The streets were strewn with flowers, and the air resounded with music. This homage totally turned the head of a man naturally haughty, and of confined ideas. Had Gonzales possessed both judgment and moderation, he might have rendered himself independent. The principal persons of his party wished it. Instead of this, he acted with blind cruelty, insatiable avarice, and unbounded pride. Even they whose interests were connected with those of the tyrant wished for a deliverer. Such a deliverer arrived from Europe in the person of Peter Di la Gasca. The squadron and the provinces of the mountains immediately declared for a person who was invested with a lawful authority to govern them. Those who had lived concealed in deserts, caverns, and forests, joined him. Gonzales met the royal army, and attacked it in the spring of 1548. One of his lieutenants, seeing him abandoned at the first charge by his best soldiers, advised him to throw himself into the enemy's battalions, and perish like a Roman; but this weak man chose rather to surrender, and end his life on a scaffold; Carvajal, a more able warrior, and more ferocious than himself, was quartered. This man, when he was expiring, boasted that he had massacred with his own hands 1400 Spaniards and 20,000 Indians. Such was the last scene of a tragedy of which every act had been marked with blood. The government was moderate enough not to continue the proscriptions; and the remembrance of the horrid calamities they had suffered kept the Spaniards in subjection. The commotion insensibly sunk into a calm; and the country remained quiet from this time for three centuries With regard to the Peruvians, the most cruel measures were taken to render it impossible for them to rebel. Tupac Amaru, the heir of their last king, had taken refuge in some remote mountains, where he lived in peace. There he was so closely surrounded by the troops sent out against him that he was forced to surrender. The viceroy Francis de Toledo caused him to be accused of several pretended crimes, and he was beheaded in 1571. All the other descendants of the incas shared a similar fate. The horror of these enormities excited so universal an indignation, both in the Old and the New World, that Phiip II. disavowed them; but the infamous policy of this prince was so notorious that no credit was given to this pretence to justice and humanity. Only one attempt was afterwards made by the Peruvians to recover their independence, and throw off the Spanish yoke: that which we have noticed as taking place in 1782.

PERU, a township of the United States, in Bennington county, Vermont.—2. A township of the United States, in Berks county, Massachusetts.—3. A township of the United States, in Clinton county, New York, on Lake Champlain, 140 miles north of Albany.

PERU, BALSAM OF. A substance obtained from the myroxylon peruiferum, which grows in the warm parts of South America. The tree is full of resin, and the balsam is obtained by boiling the twigs in water. It has the consistency of honey, a brown color, an agreeable smell, and a hot acrid taste.

PERVADE', *v. a.* } Lat. *pervado.* To pass
PERVA'SION, *n. s.* } through an aperture; to permeate: the act of passing through.

If fusion be made rather by the ingress and transcursions of the atoms of fire, than by the bare propagation of that motion, with which fire beats upon the outsides of the vessels, that contain the matter to be melted; both those kinds of fluidity, ascribed to saltpetre, will appear to be caused by the *pervasion* of a foreign body. *Boyle.*

Paper dipped in water or oil, the oculus mundi stone steeped in water, linen cloth oiled or varnished, and many other substances soaked in such liquors as will intimately *pervade* their little pores, become by that means more transparent than otherwise. *Newton.*

The laboured chyle *pervades* the pores
In all the arterial perforated shores. *Blackmore.*

Matter, once bereaved of motion, cannot of itself acquire it again, nor till it be struck by some other body from without, or be intrinsically moved by an immaterial self-active substance, that can penetrate and *pervade* it. *Bentley.*

What but God,
Pervades, adjusts and agitates the whole? *Thomson.*

PERVENCHERES, a town in the north of France, department of the Orne, with 800 inhabitants. Nine miles south-west of Mortagne, and fourteen north-east of Alençon.

PERVERSE', *adj.* Fr. *pervers*; Ital. Span. and Pers. *perverso*; Lat. *perversus*. Distorted; froward; untractable; petulant; obstinate: perversely and perverseness follow these senses: perversion is used for both the act of perverting and the state of being perverted: perversity is synonymous with perverseness: to pervert is to distort; corrupt; turn from the right; opposed to convert, which is to turn from the wrong: pervertible is apt or easy to be perverted.
PERVERSELY, *adv.*
PERVERSE'NESS, *n. s.*
PERVER'SION,
PERVER'SITY,
PERVERT', *v. a.*
PERVER'TER, *n. s.*
PERVER'TIBLE, *adj.*

Perverse lips put far from thee. *Prov.* iv. 24.

If thou seest the oppression of the poor, and violent *perverting* of justice in a province, marvel not. *Ecclus.* v. 8.

Wilt thou not cease to *pervert* the right ways of the Lord? *Acts.* xiii. 10.

Instead of good they may work ill, and *pervert* justice to extreme injustice. *Spenser's State of Ireland.*

O gentle Romeo,
If thou dost love, pronounce it faithfully;
Or if you think I am too quickly won,
I'll frown and be *perverse*, and say thee nay,
So thou wilt wooe: but else not for the world. *Shakspeare.*

Neither can this be meant of evil governours or tyrants; for they are often established as lawful potentates; but of some *perverseness* and defection in the nation itself. *Bacon.*

Women to govern men, slaves freemen, are much in the same degree; all being total violations and *perversions* of the laws of nature and nations. *Id.*

Virtue hath some *perverseness*; for she will
Neither believe her good, nor others ill. *Donne.*

Men *perversely* take up piques and displeasures at others, and then every opinion of the disliked person must partake of his fate. *Decay of Piety.*

And nature breeds
Perverse, all monstrous, all prodigious things. *Milton.*

If then his providence
Out of our evil seek to bring forth good,
Our labour must be to *pervert* that end,
And out of good still to find means of evil. *Id.*

Her whom he wishes most, shall seldom gain
Through her *perverseness*; but shall see her gained
By a far worse. *Id. Paradise Lost.*

The heinous and despiteful act
Of Satan, done in Paradise, and how
He in the serpent had *perverted* Eve,
Her husband she, to taste the fatal fruit,
Was known in heaven. *Id.*

The apostles, who sometimes inveigh so zealously against the opposers and *perverters* of truth, did in their private conversation and demeanour strictly observe their own rules of abstinence from reproach. *Barrow.*

He that reads a prohibition in a divine law, had need be well satisfied about the sense he gives it, lest he incur the wrath of God, and be found a *perverter* of his law. *Stillingfleet.*

To so *perverse* a sex all grace is vain,
It gives them courage to offend again. *Dryden.*

The *perverseness* of my fate is such,
That he's not mine, because he's mine too much. *Id.*

He has *perverted* my meaning by his glosses; and interpreted my words into blasphemy, of which they were not guilty. *Id.*

Men that do not *perversely* use their words, or purpose set themselves to cavil, seldom mistake the signification of the names of simple ideas. *Locke.*

What strange *perversity* is this of man!
When 'twas a crime to taste the' enlight'ning tree,
He could not then his hand refrain. *Norris.*

Where a child finds his own parents his *perverters*, he cannot be so properly born, as damned into the world. *South.*

The subtle practices of Eudoxius, bishop of Constantinople, in *perverting* and corrupting the most pious emperor Valens. *Waterland.*

A patriot is a dangerous post,
When wanted by his country most,
Perversely comes in evil times,
Where virtues are imputed crimes. *Swift.*

He supposes that whole reverend body are so far from disliking popery, that the hopes of enjoying the abbey lands would be an effectual incitement to their *perversion*. *Id.*

Porphyry has wrote a volume to explain this cave of the nymphs with more piety than judgment; and another person has *perverted* it into obscenity; and both allegorically. *Broome.*

We cannot charge any thing upon their nature, till we take care that it is *perverted* by their education. *Law.*

PERUGIA, the ancient Lacus Thrasymenus, one of the most considerable lakes in the central part of Italy, remarkable for the victory gained by Hannibal over the Romans, commanded by Flaminius. The scenery of its banks is very picturesque.

PERUGIA, a province of Italy, in the States of the Church, includes the ci-devant Perugino, and contains 182,000 inhabitants. It is a district of great fertility, and is watered by the Tiber and some smaller streams, together with the lake of this name.

PERUGIA, a large town of the central part of Italy, in the States of the Church, the capital of the province of this name, stands on the summit of a high hill near the Tiber; about eighty-five miles north of Rome, and thirty N. N. W. of Spoleto. It has a citadel and fortifications, but is a place of far more beauty than strength. It is the see of a bishop, and contains 16,000 inhabitants. The cathedral is an indifferent building, both in its architecture and decorations; but some of the churches, particularly that of St. Peter, belonging to a Benedictine abbey, are splendidly ornamented. This is supported by eighteen pillars of fine marble, and adorned with rich marble altars. The most interesting objects in the town are a number of valuable paintings in the churches and private collections by the celebrated Pietro Perugino (a native of this place), and by his more celebrated pupil Raphael. Here is a town-house, a small university, and several hospitals. The gate of the Piazza Grimani is of the Roman architecture. The town has also manufactures of velvet, silks, oil, and brandy.

PERUGINO (Pietro Vannucci, Il), was born at Citta della Pieve, near Perugia, in 1446. His parents, being in low circumstances, placed him at first with an inferior painter, who, however, had discretion enough to animate his pupil with an enthusiastic attachment to his profession. At this period the fine arts were cultivated, and flourished eminently at Florence; which induced

Perugino to seek for instruction in that city, where, according to the most common accounts, he had Andrea Verocchio for his instructor, but others allege, that he never had any other master than Benedetto Bonfigli of Perugia. His first work of reputation was a picture of St. Jerom contemplating a crucifix; in which the figure of the saint appeared so mortified and emaciated, as if designed after a living model. His next was a Descent from the Cross, painted for the church of St. Chiara, at Florence. In this picture the coloring is beautiful, and the air of the Virgin eminently distinguished. In one part of the design, he introduced an admirable landscape. A Florentine merchant offered treble the sum that had been paid for it, but the proposal was rejected, because Perugino declared himself incapable of finishing another so well. The celebrity he thus acquired procured him an invitation from pope Sixtus IV. to visit Rome, where he executed several works for that pontiff's chapel. On his return to Florence, where Michel Angelo Buonarroti was at that time in high esteem, he quarrelled with that great man, and was so severely satirised by the poets as to be obliged to retire to his native place. Perugino's pencil is light, and he finished his pictures highly; but his manner was dry and stiff, and his outline often incorrect. His highest honor consisted in being the instructor of Raffaelle; who, with his father Giovanni, assisted him in many of his works. Vasari recites the following story of this artist:—The monks of a monastery at Florence had engaged Perugino to paint in fresco a piece of sacred history; and the prior, who had agreed to supply the ultramarine for the work, being of a suspicious disposition, always attended while it was used, lest some of it should be embezzled. When Perugino perceived that the prior's constant inspection of the work was only occasioned by this distrust, he placed a pot of water near him, in which he often dipped his pencil, after he had loaded it with ultramarine; and the color, by its weight, instantly fell to the bottom. The prior observing the rapid consumption of his color, expressed his astonishment; but Perugino desired him neither to torment his own mind, nor indulge an unjust opinion of artists, who generally acted upon principles of honor; then pouring off the water gently, he restored to him the ultramarine which had subsided. Perugino, however, is said to have been avaricious, and that his being robbed of a box of gold was the principal cause of his death, which took place in 1524. His capital piece is thought to be an altar-piece in the church of St. Peter, at Perugia, of which the subject is the Ascension of Christ, with the disciples in different attitudes. The design is excellent, and the whole well executed. In a chapel belonging to the church of St. Giovanni in Monte is a picture of a virgin, attended by several saints, which is also esteemed one of his best performances.

PERVICA'CIOUS, *adj.* | Latin, *pervicax.*
PERVICA'CIOUSLY, *adv.* | Spitefully obsti-
PERVICA'CIOUSNESS, *n. s.* | nate; peevish;
PERVICAC'ITY, | contumacious.
PER'VICACY. | Rarely used.

But in case of the *pervicacy* of a peevish heretic who would not submit to the power of the church, &c. *Taylor.*

Gondibert was in fight audacious,
But in his ale most *pervicacious.* *Denham.*

May private devotions be efficacious upon the mind of one of the most *pervicacious* young creatures! *Clarissa.*

PER'VIOUS, *adj.* | Lat. *pervius.* Admit-
PER'VIOUSNESS, *n. s.* | ting passage; capable of being permeated: quality of admitting a passage.

The Egyptians used to say, that unknown darkness is the first principle of the world; by darkness they mean God, whose secrets are *pervious* to no eye. *Taylor.*

The *perviousness* of our receiver to a body much more subtle than air, proceeded partly from the looser texture of that glass the receiver was made of, and partly from the enormous heat, which opened the pores of the glass. *Boyle.*

There will be found another difference besides that of *perviousness.* *Holder's Elements of Speech.*

Leda's twins,
Conspicuous both, and both in act to throw
Their trembling lances brandished at the foe,
Nor had they missed; but he to thickets fled,
Concealed from aiming spears, nor *pervious* to the steed. *Dryden.*

What is this little, agile, *pervious* fire,
This fluttering motion which we call the mind? *Prior.*

Those lodged in other earth, more lax and *pervious,* decayed in tract of time, and rotted at length. *Woodward.*

PERVISSE, a town of France, in the department of Lys, and late province of Austrian Flanders; six miles W. N. W. of Dixmude.

PERUKE', *n. s.* & *v. a.* | Fr. *peruque;* Ital.
PERUKE'-MAKER, *n. s.* | *perucca.* A cap of false hair; a periwig: to dress in false hair.

I put him on a linen cap, and his *peruke* over that. *Wiseman.*

PERUSE', *v. a.* | Lat. *per* and use, or *per-*
PERU'SALS, *n. s.* | *visus.* To read; observe;
PERU'SER. | examine: perusal is the act of reading or examining: peruser, a reader; examiner.

Peruse this writing here, and thou shalt know
The treason. *Shakspeare. Richard II.*

I hear the enemy;
Out some light horsemen, and *peruse* their wings. *Shakspeare.*

I've *perused* her well;
Beauty and honour in her are so mingled,
That they have caught the king. *Id.*

The petitions being thus prepared, do you constantly set apart an hour in a day to *peruse* those petitions. *Bacon.*

Myself I then *perused,* and limb by limb
Surveyed. *Milton's Paradise Lost.*

Carefully observe, whether he tastes the distinguishing perfections or the specific qualities of the author whom he *peruses.* *Addison.*

As pieces of miniature must be allowed a closer inspection, so this treatise requires application in the *perusal.* *Woodward.*

The difficulties and hesitations of every one will be according to the capacity of each *peruser,* and as his penetration into nature is greater or less. *Id.*

If upon a new *perusal* you think it is written in the very spirit of the ancients, it deserves your care, and is capable of being improved. *Atterbury.*

Mr. Pope told him, that he read it once over, and was not displeased with it; that it gave him more pleasure at the second perusal, and delighted him still more at the third. *Johnson.*

PERUSIA, an ancient town of Etruria, on the Tiber, built by Oenus; where L. Antonius was besieged by Augustus, till he surrendered. (Strabo.) It is now called Perugia.

PERUVIAN BARK, or JESUITS' BARK, the bark of the cinchona officinalis, a well known medicine. See CINCHONA. The pale and the red are chiefly used in Britain. The pale is brought to us in pieces of different sizes, either flat or quilled, and the powder is rather of a lighter color than that of cinnamon. The red is generally in much larger, thicker, flattish pieces, but sometimes also in the form of quills, and its powder is reddish like that of Armenian bole. It is much more resinous, and possesses the sensible qualities of the cinchona in a much higher degree than the other sorts; and the more nearly the other kinds resemble the red bark, the better they are now considered. The red bark is heavy, firm, sound, and dry; friable between the teeth; does not separate into fibres; and breaks, not shivery, but short, close, and smooth. It has three layers; the outer is thin, rugged, of a reddish brown color, but frequently covered with mossy matter: the middle is thicker, more compact, darker colored, very resinous, brittle, and yields first to the pestle; the inmost is more woody, fibrous, and of a brighter red. The Peruvian bark yields its virtues both to cold and boiling water; but the decoction is thicker, gives out its taste more readily, and forms an ink with a chalybeate more suddenly than the fresh cold infusion. This infusion, however, contains at least as much extractive matter, but more in a state of solution; and its color, on standing some time with the chalybeate, becomes darker, while that of the decoction becomes more faint. When they are of a certain age, the addition of a chalybeate renders them green; and, when this is the case, they are in a state of fermentation, and effete. Mild or caustic alkalies, or lime, precipitate the extractive matter, which in the case of the caustic alkali is re-dissolved by a farther addition of the alkali. Lime-water precipitates less from a fresh infusion than from a fresh decoction; and in the precipitate of this last some mild earth is perceptible. The infusion is by age reduced to the same state with the fresh decoction, and then they deposit nearly an equal quantity of mild earth and extractive matter; so that lime-water, as well as a chalybeate, may be used as a test of the relative strength and perishable nature of the different preparations, and of different barks. Accordingly cold infusions are found by experiments to be less perishable than decoctions; infusions and decoction of the red bark than those of the pale; those of the red bark, however, are found by length of time to separate more mild earth with the lime-water, and more extracted matter. Lime-water, as precipitating the extracted matter, appears an equally improper and disagreeable menstruum. Water suspends the resin by means of much less gum than has been supposed. Rectified spirit of wine extracts a bitterness, but no astringency, from a residuum of twenty affusions of cold water; and water extracts astringency, but no bitterness, from the residuum of as many affusions of rectified spirit. The residua in both are insipid. From many ingenious experiments made on the Peruvian bark by Dr. Irvine, published in a dissertation which gained the prize-medal given by the Harveian Society of Edinburgh for 1783, the power of different menstrua, as acting upon Peruvian bark, is ascertained with greater accuracy than had before been done: and, with respect to comparative power, the fluids after mentioned act in the order in which they are placed:—1. Dulcified spirit of vitriol. 2. Caustic ley. 3. French brandy. 4. Rhenish wine. 5. Soft water. 6. Vinegar and water. 7. Dulcified spirit of nitre. 8. Mild volatile alkali. 9. Rectified spirit of wine. 10. Mild vegetable alkali. 11. Lime-water. The antiseptic powers of vinegar and bark united are double the sum of those taken separately. The astringent power of the bark is increased by acid of vitriol; the bitter taste is destroyed by it. The officinal preparations of the bark are, 1. The powder: of this the first parcel that passes the sieve, being the most resinous and brittle layer, is the strongest. 2. The extract: the watery and spirituous extract conjoined form the most proper preparations of this kind. 3. The resin: this cannot perhaps be obtained separate from the gummy part, nor would it be desirable. 4. Spirituous tincture: this is best made with proof-spirit. 5. The decoction: this preparation, though frequently employed, is yet in many respects inferior even to a simple watery infusion. The best form is that of powder; in which the constituent parts are in the most effectual proportion. The cold infusion, which can be made in a few minutes by agitation, the spirituous tincture, and the extract, are likewise proper in this respect. For covering the taste, different patients require different vehicles; liquorice, aromatics, acids, port wine, small beer, porter, milk, butter-milk, &c., are frequently employed; and it may be given in form of electuary with currant jelly, with brandy, or with rum.

PERUVIAN CAMEL. See CAMELUS.

PERUVIAN HARE. See LEPUS.

PERUVIAN SHEEP. See CAMELUS.

PERUZZI (Balthasar), an historical painter and architect, born in 1481. He went to Rome, and was employed by Alexander VI., Julius II., and Leo X. He was so perfect in chiaro obscuro and perspective that Titian himself beheld his works with astonishment. He was in Rome in 1527, when Charles V. sacked it; but procured his liberty by painting a portrait of the constable, Bourbon. He died in 1556, aged fifty-five.

PERWANNAH, in the language of Bengal, an order of government, or a letter from a man in authority.

PERWUTTAM, a small town of Hindostan, situated on the south bank of the River Krishna, in a wild tract of country almost uninhabited, except by the Chinsuars, 118 miles south from Hyderabad. Red granite abounds here, and diamonds are found in the mountains; but the labor is so great, and the chance of meeting with

the veins so uncertain, that the digging for them has been abandoned.

At this place is a remarkable pagoda dedicated to the deity called Mallecarjee, in showing of whom a great deal of mystery is observed. He is exhibited in the back part of a building, by the reflected light of a brass speculum, and of course can only be seen as the flashes fall on him. 'The idol is probably nothing more,' says Mr. Hamilton, 'than the Lingam so much reverenced by the votaries of Siva. The revenues derived from the resort of pilgrims are collected by a manager, who resides within the enclosure. There is a goddess also worshipped here, named Brahma Rumbo. The several pagodas, choultries, courts, &c., are enclosed by a wall 660 feet long, by 510 broad, the walls of which are covered by an infinite variety of sculpture.'

PES, in antiquities, a foot or measure of length among the Romans, equal to eleven inches 604 decimal parts. The πες, or foot of the Grecians, was equal to one foot and 875 decimal parts of an inch.

PES MONETÆ, in archæology, a true and reasonable adjustment of the value of all coin.

PESADE', *n. s.*

Pesade is a motion a horse makes in raising or lifting up his forequarters, keeping his hind legs upon the ground without stirring. *Farrier's Dictionary.*

PESANTE, in music, slow, dragging.

PESARO, a town of Italy in the States of the Church and province of Urbino, is situated near the Foglia, between the Adriatic and a range of cultivated hills. It is surrounded with fortifications and well built, the streets being clean and airy. Its market-place is ornamented with a fountain and marble statue of Urban VIII.: some of the churches are also remarkable for their paintings and architecture. The latter are San Giovanni, La Misericordia, and San Carolo. The inhabitants have little trade, but cultivate the surrounding country in wine, olives, figs, and silk. The climate was once very unhealthy in summer on account of the marshes, which are now drained. Pesaro is the see of a bishop. Population 10,000. Eighteen miles E. N. E. of Urbino, and thirty-four north-west of Cincona.

PESCE (Nicholas), a famous Sicilian diver, who, according to Kircher, was, from his amazing skill in swimming, and his perseverance under water, surnamed the fish. This man had from his infancy been used to the sea; and earned his scanty subsistence by diving for corals and oysters, which he sold to villagers on shore. His long acquaintance with the water, at last, brought it to be almost his natural element. Kircher says, 'He was frequently known to spend five days in the midst of the waves, without any other provisions than the fish which he caught there and ate raw. He often swam over from Sicily into Calabria, a tempestuous and dangerous passage, carrying letters from the king. He was frequently known to swim among the gulfs of the Lipari Islands, no way apprehensive of danger. Some mariners out at sea, one day observed something at some distance from them, which they regarded as a sea-monster; but, upon its approach, it was known to be Nicholas, *whom they took into their ship. When they asked him whither he was going in so stormy* and rough a sea, and at such a distance from land, he showed them a packet of letters, which he was carrying to one of the towns of Italy. He kept them thus company for some time in their voyage, conversing, and asking questions; and, after eating a hearty meal with them, took his leave, and, jumping into the sea, pursued his voyage alone. In order to aid these powers of enduring in the deep, nature seemed to have assisted him in a very extraordinary manner; for his fingers and toes were webbed, and his chest became very capacious. The account of so extraordinary a person did not fail to reach the king himself; who commanded Nicholas to be brought before him. The curiosity of this monarch had been long excited by the accounts he had heard of the bottom of the Gulf of Charybdis, which he now therefore commanded our poor diver to examine; and, as an incitement to his obedience, ordered a golden cup to be flung into it. Nicholas was not insensible of the danger to which he was exposed, and he presumed to remonstrate: but the hope of the reward, the desire of pleasing the king, and the pleasure of showing his skill, at last prevailed. He instantly jumped into the gulf, and continued for three-quarters of an hour below; during which time the king and his attendants became very anxious for his fate; but he at last appeared, holding the cup in triumph in one hand, and making his way good among the waves with the other. Having refreshed himself by sleeping, there were four things, he said, which rendered the gulf dreadful, not only to men, but to fish. 1. The force of the water bursting up from the bottom, which required great strength to resist. 2. The abruptness of the rocks that on every side threatened destruction. 3. The force of the whirlpool dashing against those rocks. And, 4. The number and magnitude of the polypous fish, some of which appeared as large as a man; and which, every where sticking against the rocks, projected their fibrous arms. Being asked how he was able so readily to find the cup that had been thrown in, he replied that it happened to be flung by the waves into the cavity of a rock against which he himself was urged in his descent. This account, however, did not satisfy the king's curiosity. Being requested to venture once more into the gulf for further discoveries, he at first refused: but the king repeated his solicitations; and, to give them still greater weight, produced a larger cup than the former, and added also a purse of gold. With these inducements, says Kircher, the unfortunate diver once again plunged into the whirlpool, and was never heard of more.'

PESHAWUR, PESHOUR, or PEISHORE, a city and district of Afghaunistaun, in the province of Cabul, formerly Bekram. It is watered by the Kameh or Cabul River, and surrounded on all sides except the east by a range of mountains, which defend it from the blasts of winter, but render it very hot during the summer solstice. The soil is a rich black mould, watered by an innumerable number of mountain streams. It is inhabited by five tribes of Afghauns, the prin-

cipal of whom are the Mohammed Zyes and the Momends; and is said to contain 300,000 inhabitants. It is the favorite residence of the Afghaun court in winter, is celebrated for its extensive gardens and fruit, particularly melons, and is without doubt one of the finest spots in the king's dominions. The revenue is estimated at £100,000 sterling.

Peshawur, the ancient capital of the above mentioned district, stands on an uneven surface, is upwards of five miles in circumference. The houses are of unburnt brick, in wooden frames, and are mostly three stories high. The streets are narrow, but paved, with a kennel in the middle. Two or three brooks which run through the town, are crossed by bridges, which fall into the Kameh or Cabul River, which passes some miles north of the city. There are many mosques in the town, but none of them are worthy of notice, except a fine caravanserai, and the Bala Hissar or citadel, situated on a hill to the north, which contains some fine halls, and is adorned with some spacious gardens. It is the occasional residence of the king. Some other of the palaces are splendid. The city is inhabited by persons from all parts of the east, but the common languages are the Pushtoo and Hindostany. Peshawur is mentioned in the tenth century, but was much improved by the emperor Akber, and has long been the residence of a brave tribe, called the Hazarees, of Tartar origin.

PESSARY, *n.s.* Fr. *pessaire;* Gr. *πεσσαριον*. An oblong form of medicine, made to thrust up into the uterus.

Of cantharides he prescribes five in a *pessary*, cutting off their heads and feet, mixt with myrrh. *Arbuthnot.*

Pessary, in medicine, is also a solid substance composed of wool, lint, or linen, mixed with powder, oil, wax, &c., made round and long like a finger, in order to be introduced in the exterior neck of the matrix, for the cure of uterine disorders.

PESSIERE, French, in fortification, a dam that is raised for the purpose of confining a sufficient quantity of water in a reservoir, by which any machine may be worked, or kept in motion. The overflowing of the river may run over this dam without doing any injury to it.

PEST', *n.s.*
Pest'-house,
Pestif'erous, *adj.*
} Fr. *peste;* Lat. *pestis.* Plague; pestilence; mortal or destructive disease; any thing mischievous or destructive: pest-house, a hospital; particularly for those infected with the plague: pestiferous is destructive; malignant; infectious.

Such is thy audacious wickedness,
Thy leud, *pestiferous*, and dissentious pranks,
The very infants prattle of thy pride. *Shakspeare.*

At her words the hellish *pest*
Forbore. *Milton's Paradise Lost.*

In a bodily contagion, we hold it not safe to suffer the sick persons to converse with the whole; but remove them to a *pest-house* remote from the vicinity of others. *Bp. Hall.*

Of all virtues justice is the best;
Valour without it is a common *pest*. *Waller.*

Let fierce Achilles
The god propitiate, and the *pest* assuage. *Pope.*

The *pest* a virgin's face and bosom bears,
High on her crown a rising snake appears,
Guards her black front, and hisses in her hairs. *Id.*

It is easy to conceive how the steams of *pestiferous* bodies taint the air, while they are alive and hot. *Arbuthnot.*

Stand aloof,
And let the *pest's* triumphal chariot
Have open way advancing to the tomb.
See how he mocks the pomp and pageantry
Of earthly kings! *Wilson.*

Pest, or Pesth, a palatinate of Hungary, lying chiefly along the east bank of the Danube, from the point where it begins to flow southward to the borders of the palatinate of Batsch. It is composed of three counties, which were formerly distinct, viz. Pest, Pellsh, or Pilis, and Solt. That of Pilis lies to the west of the Danube, and contains the town of Buda. These counties supply the chief branch of the revenue of the palatine of Hungary. Their area is 4050 square miles, and their population 362,000. The inhabitants are a mixed race, being partly Magyars, partly Sclavonians, Germans, Walachians, gypsies and Jews. The surface is generally level, and the heath of Ketskemet (see Ketskemet) is one of the most remarkable tracks in the kingdom; yet in the north there are several mountains. The country is laid out in tillage and pasturage. Wine of good quality is made at Buda. Near Pest is the plain of Rakos, where the Hungarian diet used to meet.

Pest, or Pesth, a considerable city of Hungary, is situated on the bank of the Danube; the course of the river being from north to south; and Pesth standing on the east bank, opposite to Buda. It is only separated from that place by a bridge of boats, three-quarters of a mile in length. Buda is the residence of the viceroy, and accounted consequently the capital of the country; but Pest is the seat of the high courts of justice, and the place of meeting for the diet. It is also considerably larger, having 42,000 inhabitants. It consists of the Old and New Towns; throughout the whole, the streets are tolerably spacious and regular, and the houses respectable. Of the public buildings, the principal are the hospital of invalids, the barracks, and a quadrangular military edifice, begun in 1786 by Joseph II. Of the churches, the Catholics have four; the Lutherans, the Calvinists, and the followers of the Greek faith, one each. The university, the only one in Hungary, is richly endowed: the professors are forty in number; the students between 700 and 800. The observatory is on the Buda side of the river. The manufactures here comprise silks, cotton, jewellery, leather, and musical instruments; also tobacco, which is a government monopoly. The Danube affords means of intercourse with a large track of country, and the fairs of Pesth are numerously attended. Here is a theatre, erected in 1808; public walks near the Danube, and public gardens; on the Buda side of the river are hot springs. The city is not of remote origin, but has often been besieged. It is 130 miles E. S. E, of Vienna.

PESTALOZZI, or Pestaluz (Henry), a practical philosopher of the Seven Cantons, famous as the inventor of a modern mode of instruction.

He was born of a good family at Zurich, January 12th, 1745, acquired early habits of industry, and adopted from inclination the employment of a teacher. He first developed his very original ideas in a fictitious narrative, entitled Lienhard and Gertrude, printed at Leipsic in 1781–1787, which has been translated into most European languages. Pestalozzi was powerfully seconded in his philanthropic projects by Tscharner, bailli of Wildenstein, a rich Swiss proprietor, the Arner of his romance. He composed many other works, with a view to the same object; and amongst others a weekly paper, the numbers of which were republished in 2 vols. 8vo.; Letters on the Education of the Children of Indigent Parents; Reflections on the Progress of Nature in the development of the Human Species; Images for my Abecedary, or Elements of Logic for my Use. In 1799 the Helvetic government appointed him director of the orphan-house at Stantz, in the canton of Underwald; and, on the dissolution of that establishment, the chateau of Burgdorf, four leagues from Berne, was granted him. The number of pupils which now flocked to him induced him to remove his seminary to the castle of Yverdun. In 1803 the canton of Zurich nominated him a member of the Helvetic Consulta, summoned by Buonaparte to Paris; and he subsequently received from the emperor of Russia the order of St. Wladimir. He closed a long and philanthropic life on the 17th of February, 1827, at Brugg, in Switzerland.

PESTER, *v. a.*, PES'TERER, *n. s.*, PES'TEROUS, *adj.* Fr. *pester*, à Lat. *pestis*. To annoy; perplex; harass; encumber: a pesterer is one who harasses or disturbs: pesterous, cumberous; annoying.

Fitches and pease
For *pestering* too much on a hovel they lay.
Tusser.

Who then shall blame
His *pestered* senses to recoil and start,
When all that is within him does condemn
Itself for being there? *Shakspeare. Macbeth.*

He hath not failed to *pester* us with message,
Importing the surrender of those lands. *Shakspeare.*

In the statute against vagabonds note the dislike the parliament had of gaoling them, as that which was chargeable, *pesterous*, and of no open example. *Bacon's Henry VII.*

Confined and *pestered* in this pinfold here,
Strive to keep up a frail and feverish being.
Milton.

We are *pestered* with mice and rats, and to this end the cat is very serviceable. *More against Atheism.*

A multitude of scribblers daily *pester* the world with their insufferable stuff. *Dryden.*

They did so much *pester* the church and delude the people, that contradictions themselves asserted ------s were equally revered by them as the infallible will of God. *South.*

At home he was pursued with noise;
Abroad was *pestered* by the boys. *Swift.*

I am positive I have a soul; nor can all the books with which materialists have *pestered* the world ever convince me to the contrary. *Sterne.*

PES'TILENCE, *n. s.*, PES'TILENT, *adj.*, PESTILEN'TIAL, PES'TILENTLY, *adv.* Fr. *pestilence*; Lat. *pestilentia*. Pest; plague; mortal or infectious distemper: pestilent and pestilential mean, partaking of the nature of pestilence; contagious; producing plague or disease; malignant: pestilently is mischievously; destructively.

We have found this man a *pestilent* fellow, and a mover of sedition among all the Jews. *Acts* xxiv. 5.

There is nothing more contagious and *pestilent* than some kinds of harmony; than some nothing more strong and potent unto good. *Hooker.*

Hoary moulded bread the soldiers thrusting upon their spears railed against king Ferdinand, who with such corrupt and *pestilent* bread would feed them. *Knolles.*

The red *pestilence* strike all trades in Rome,
And occupations perish. *Shakspeare.*

Great ringing of bells in populous cities dissipated *pestilent* air, which may be from the concussion of the air, and not from the sound. *Bacon.*

One *pestilent* fine,
His beard no bigger though than thine,
Walked on before the rest. *Suckling.*

Which precedent, of *pestilent* import,
Against thee, Henry, had been brought.
Daniel.

If government depends upon religion, then this shews the *pestilential* design of those that attempt to disjoin the civil and ecclesiastical interests. *South.*

Fire involved
In *pestilential* vapours, stench, and smoak.
Addison.

These with the air passing into the lungs, infect the mass of blood, and lay the foundation of *pestilential* fevers. *Woodward.*

To those people that dwell under or near the equator a perpetual spring would be a most *pestilent* and insupportable summer. *Bentley.*

The world abounds with *pestilent* books, written against this doctrine. *Swift's Miscellanies.*

PESTILLA'TION, *n. s.*, PES'TLE. Lat. *pistillum*; Ital. *pestello*, *pistelle*. The act of pounding or breaking in a mortar: the instrument with which things are broke in a mortar.

The best diamonds are comminuble, and so far from breaking hammers, that they submit unto *pestillation*, and resist not any ordinary *pestle*. *Browne.*

What real alteration can the beating of the *pestle* make in any body, but of the texture of it? *Locke.*

Upon our vegetable food the teeth and jaws act as the *pestle* and mortar. *Arbuthnot.*

PESTIS, the plague. See MEDICINE, Index.

PET', *n. s.*, PET'TISH, *adj.*, PET'TISHNESS, *n. s.* Ital. *petto*; Lat. *pectus*, the breast? A slight passion or grief: pettish is fretful; peevish: pettishness, peevishness.

Nor doth their childhood prove their innocence;
They're froward, *pettish*, and unused to smile.
Creech.

If all the world
Should in a *pet* of temperance feed on pulse,
Drink the clear stream and nothing wear but frieze,
The all-giver would be unthankt, would be unpraised.
Milton.

If we cannot obtain every vain thing we ask, our next business is to take *pet* at the refusal.
L'Estrange.

Life, given for noble purposes, must not be thrown up in a *pet*, nor whined away in love. *Collier.*

Like children, when we lose our favorite plaything, we throw away the rest in a fit of *pettishness*. *Id.*

They cause the proud their visits to delay,
And send the godly in a *pet* to pray. *Pope.*

PET, *n. s.* Probably from petit, little. See PEAT. A lamb taken into the house, and brought up by hand: a cade lamb.

PE'TAL, *n. s.* } Lat. *petalum.* The leaf of PET'ALOUS. } a flower: having petals.

Petal is a term in botany, signifying those fine coloured leaves that compose the flowers of all plants: whence plants are distinguished into monopetalous, whose flower is one continued leaf; tripetalous, pentapetalous, and polypetalous, when they consist of three, five, or many leaves. *Quincy.*

PETAL, in botany. See BOTANY.

PETALIFORME. See BOTANY.

PETALISM, a mode of deciding on the guilt of citizens, similar to the Athenian Ostracism. It was introduced in Syracuse about A. A. C. 460, to prevent the tyranny of the richer citizens, who had often about that time aimed at the diadem. To prevent, therefore, the evils daily arising from thence, and to bring down the aspiring minds of the wealthy citizens, the Syracusans were obliged to make a law like that of the Athenian ostracism; differing only in this, that every citizen at Syracuse should write on a leaf, instead of a shell, the names of such as they apprehended powerful enough to usurp the sovereignty. When the leaves were counted, he who had the most suffrages against him was, without farther enquiry, banished for five years. This method of weakening the interest of the overgrowing citizens was called petalism, from πεταλον, a leaf. This law was attended with many evil consequences; for those who were most capable of governing the commonwealth were driven out, and the administration of public affairs committed to the meanest of the people; nay, many of the chief citizens, who were able to render their country great service, fearing to fall under the penalties of this law, withdrew from the city, and lived private in the country, not concerning themselves with public affairs: whence, all the employments being filled with men of no merit or experience, the republic was on the brink of ruin, and ready to fall into a state of anarchy and confusion. The law, therefore, of petalism, upon more mature deliberation, was repealed soon after it had been enacted, and the reins of government were again put into the hands of men who knew how to manage them.

PETALITE, a mineral discovered in the mine of Uto in Sweden by M. D'Andrada, interesting, from its analysis by M. Arfredson having led to the knowledge of a new alkali.

This rare mineral occurs in masses, which have a foliated structure, and are divisible in directions parallel to the planes of a four-sided prism, whose bases are elongated rhombs, or parallelograms with angles of 137° 08′ and 42° 52′, according to Haüy. The laminæ are sometimes scaly, undulated, or interlaced. It scratches glass, and has nearly the hardness of feldspar. Its lustre is usually glistening, and somewhat pearly; the planes, produced by mechanical division in one direction, have however a higher lustre. It is translucent in different degrees; and its color is white, either milk white, or with shades of gray, red, or green; the red sometimes appears as a slight tinge of pink. Its specific gravity is between 2·4 and 2·6.

Chemical characters.—When strongly by the blow-pipe it melts, according to Arfvedson, into a transparent porous glass. Unless the fragment be very minute, its surface only will be fused. It contains, according to a mean of three analyses by Arfvedson, silex 79·2, alumine 17·2, lithia 5·7; = 100·1. Professor Clarke's analysis gives silex 80·0, alumine 15·0, lithia 1·75, oxide of manganese 2·5, water 0·75. An analysis by Vauquelin gives silex 78, alumine 13, lithia 7; = 98.

The new alkali, lithia, was first discovered in the petalite by Arfvedson. It sometimes resembles white quartz, but is easily distinguished by the foregoing characters:—It has been found only in Sweden, at Uto, Sahla, and Finngrufan, and is usually associated with quartz, feldspar, spodumen, &c.

This interesting mineral has been lately said by Dr. Brewster to have a perfect crystalline structure, and to possess two axes of double refraction.

PETAR', *n. s.* } Fr. *petard;* Ital. *petardo;* PETARD', *n. s.* } of Lat. *pedo.* An exploding engine of warfare, used formerly in sieges. See below.

'Tis the sport to have the engineer
Hoist with his own *petard.* *Shakspeare. Hamlet.*

Find all his having and his holding,
Reduced t' eternal noise and scolding;
The conjugal *petard* that tears
Down all portcullices of ears. *Hudibras.*

A *petard* is an engine of metal, almost in the shape of a hat, about seven inches deep, and about five inches over at the mouth; when charged with fine powder well beaten, it is covered with a madrier or plank, bound down fast with ropes, running through handles, which are round the rim near the mouth of it: this *petard* is applied to gates or barriers of such places as are designed to be surprised, to blow them up: they are also used in countermines to break through into the enemy's galleries. *Military Dictionary.*

PETAR, or PETARD. Fr. petard, Italian petardo. A petard is an engine of metal, almost in the shape of a hat, about seven inches deep, and about five inches over at the mouth; when charged with fine powder, well beaten, it is covered with a madrier or plank, bound down fast with ropes, running through handles, which are round the rim, near the mouth of it. The petard is applied to gates or barriers of such places as are designed to be surprised, to blow them up; they are also used in countermines, to break through into the enemy's galleries. Its invention is ascribed to the French Huguenots in 1579, who by means of petards took Cahors, in the same year. Petards are of four different sizes: the first contains 12 lbs. 13 ozs.; second 10 lbs. 11 ozs.; third 1 lb. 10 ozs.; fourth 1 lb. The blind fuse composition for them is of mealed powder 7 lbs., wood ashes 3 ozs.

PETAU (Denis), or PETAVIUS (Dionysius), a French Jesuit of great erudition, born at Orleans in 1583. He was but nineteen years of age when he was made professor of philosophy in the University of Bourges. He joined the Jesuits in 1605, and did great credit to them by his erudition. He became a zealous advocate for the church of Rome; and criticised and abused its

adversaries. His chief work, which is still in great repute, he entitled Rationarium Temporum. It is an abridgment of universal history, from the earliest times to 1632, with authorities. He died at Paris in 1652.

PETAURI, in zoology, flying squirrels; a subdivision in the genus sciurus. They have a hairy membrane extended from the fore to the hind legs, adapted for flying. They are styled by Linnæus and Gmelin sciuri volantes, flying squirrels, in distinction from the sciuri scandentes, or climbling squirrels; but Dr. Shaw styles them petauri, wherein he is followed by Mr. Kerr, who enumerates eight species. See SCIURUS.

PETAURISTÆ, in antiquity, those who exhibited their feats on the petaurum.

PETAURUM. Gr. πεταυρον, or πετευρον, a ledge fixed to a wall, on which birds used to roost.—Varro de Re Rust, l. 3, c. 9; Poll. Onom. l. 10, segm. 156. The petaurum was also a machine hung high in the air, from which the petauristæ threw themselves, and descended to the earth by means of a rope.—Juv. Sat. 14, v. 265.

PETCHELEE, a large and flat province of the Chinese empire, in which Pekin is situated. The sea is the western boundary of the province, and, with the river Peiho, enables it to carry on a considerable trade with Corea and Japan. Its prosperity is chiefly supported by the communication maintained by its rivers with the imperial canal. By it the tribute of all the provinces, paid chiefly in kind, is conveyed, and vast numbers of persons who live entirely on the water, subsisting by fishing or breeding of ducks. The population was stated to Sir George Staunton at 38,000,000; but this there can be no doubt is a good deal exaggerated. Rice, wheat, and barley, are raised here.

PETECHIÆ, in medicine, a name given to those spots, whether red or of any other color, which appear in malignant fevers.

PETE'CHIAL, *adj.* Lat. *petechiæ*. Pestilentially spotted. Obsolete.

In London are many fevers with buboes and carbuncles, and many *petechial* or spotted fevers.
Arbuthnot.

PETER (St.), the apostle, born at Bethsaida, was son of Jonas, and brother of St. Andrew.—John i. 42, 43. His first name was Simon; but, when our Saviour called him to the apostleship, he changed his name into Cephas, that is, in Syriac, a stone, or a rock; in Latin petra, whence Peter. He was a married man; and had his house, his mother-in-law, and his wife, at Capernaum, upon the lake of Gennesareth.—Mark i. 29; Mat. viii. 14; Luke iv. 38. St. Andrew, having been first called by Jesus Christ, met his brother Simon, and told him (John i. 41), 'we have seen the Messiah,' and then brought him to Jesus. After having passed one day with our Saviour, they returned to their ordinary occupation, fishing. But it is thought they were present with him at the marriage of Cana in Galilee This happened A. D. 30. St. Peter's miraculous draught of fishes; the cure of his wife's mother; his walking upon the waters; his answers to our Saviour's important questions; his presence at the transfiguration; his payment of the tribute; his questions respecting forgiveness, and the destruction of the temple; his vain self-confidence that he would stand by his Lord; his triple denial of him soon after, with his consequent repentance; his meeting with him after his resurrection; his second miraculous draught of fishes; our Saviour's trying questions to him; his meeting with the other apostles; the miraculous gift of tongues; his sermon, or address to the people; the consequent conversion of 3000 persons; his miraculous cure of the lame beggar, and conversion of other 5000; his imprisonment by the priests and sadducees, and his boldness on that occasion; his annunciation of death to Ananias and Sapphira; his second imprisonment and liberation by an angel; his boldness before the Jewish rulers; his sufferings and dismission; his preaching at Samaria; his reproof to Simon the magician; his cure of Æneas at Lydda; his raising up Tabitha from death; his vision at Joppa, the message to him from Cornelius, and his conversion; Peter's visit to him, and the consequences; his return to Jerusalem; with his imprisonment by Herod Agrippa, A. D. 44; are all recorded, with many other interesting particulars, in the Gospels and Acts of the Apostles. After his delivery from prison by the angel, he left Jerusalem; but we are not told what became of him till the council held at Jerusalem in the year 51. It is thought that before this time he made his second journey to Rome, whence he wrote his first epistle. St. Peter was obliged to leave Rome in the year 51, by order of the emperor Claudius, who had banished all Jews from thence. The particulars of St. Peter's life are little known from A. D. 51, in which the council of Jerusalem was held, till his last journey to Rome, which was some time before his death. Then, being acquainted by revelation that the time of his death was not far off (2 Pet. i. 14), he wrote to the faithful his second epistle. St. Peter and St. Paul came to Rome, it is said, about the same time, A. D. 65, where they performed many miracles, and made many converts. Simon Magus, by his tricks, continued here to deceive the people, pretending himself to be the Messiah, and even attempting to ascend into heaven. See SIMON MAGUS. Soon after this St. Peter was thrown into prison, where he continued, we are told, for nine months; at last he was crucified in the Via Ostia, with his head downwards, as he himself had desired of his executioners. This he did out of a sense of humility, lest it should be thought, as St. Ambrose says, that he affected the glory of Jesus Christ. It is said that his body was at first buried in the catacombs, two miles from Rome, from whence it was afterwards transported to the Vatican, where it has lain ever since. His festival is celebrated with that of St. Paul, on the 29th of June. St. Peter died A. D. 66, after having been bishop of Rome, according to the general account, about twenty-four or twenty-five years. His age was about seventy-four or seventy-five. It is agreed that St. Linus was his successor. St. Peter has been made the author of several books; such were his Acts, his Gospel, his Revelation, his work about preaching, and another about Judgment. There is extant a large history of

St. Peter, called The Recognition, ascribed to St. Clement.

Peter of Blois, a learned man of the twelfth century, born about 1120, at Blois, in France. He was the first person who employed the famous word transubstantiation. He was appointed preceptor to William II. king of Sicily, in 1167, and obtained the custody of the privy seal. In 1168 he left Sicily and returned into France. He was soon after invited into England by Henry II., who employed him as his private secretary, made him archdeacon of Bath, and gave him some other benefices. When he had spent a few years at court, he retired into the family of Richard archbishop of Canterbury, who had made him his secretary and chancellor about 1176. In this station he continued to the death of the archbishop in 1183, enjoying the highest degree of favor with that prelate. Our author remained in the same station with archbishop Baldwin, who succeeded Richard. He was also sent by that prelate to plead his cause before pope Urban III. After the departure of Baldwin for the Holy Land, in 1192, our author was involved in various troubles in his old age; and died about the end of the twelfth century. He appears from his works, which may be justly reckoned among the most valuable monuments of the age in which he flourished, to have been a man of great integrity and sincere piety, as well as of a lively inventive genius and uncommon erudition. His printed works consist of 134 letters, which he collected at the desire of Henry II.; of sixty-five sermons; and of seventeen tracts on different subjects.

Peter the Hermit. See Crusades, vol. iv. p. 680.

Peter I., styled the Great, czar, and afterwards emperor of Russia, founder of the Russian empire; for though the country was well known, and of great antiquity, yet it had no extent of power, of political influence, or of general commerce, in Europe, till his time. He was born in 1672; and was proclaimed czar when but ten years of age, in exclusion of John his elder brother, who was of a sickly constitution and weak mind. The princess Sophia, his half sister, made an insurrection in favor of John; and, to put an end to the civil war, it was at last agreed that the two brothers should jointly share the imperial dignity. Peter had been very negligently educated, not only through the general defects of the Russian system, but likewise through the arts of the Princess Sophia, who surrounded him with every thing that might stifle his natural desire of knowledge, and deprave his mind. Notwithstanding this, his inclination for military exercises discovered itself in his tenderest years. He formed a company of fifty men, commanded by foreign officers, clothed and exercised after the German manner; he entered himself into the lowest post, that of a drummer; and never rose otherwise than as a soldier of fortune. He now reinforced his company with several others, till at last he had got together a considerable body of soldiers, and by this means gradually secured a body of well disciplined troops. The sight of a Dutch vessel which he had met with on a lake belonging to one of his pleasure-houses, made such an impression on his mind, that he conceived the almost impracticable design of forming a navy. His first care was to get some Hollanders to build some small vessels at Moscow; and he passed two successive summers on board English or Dutch ships, which set out from Archangel, that he might instruct himself in every branch of naval affairs. In 1696 czar John died, and Peter was now sole master of the empire. In 1698 he sent an embassy to Holland; and went incognito in the retinue, visiting England as well as Holland, to inform himself fully in the art of ship-building. At Amsterdam he worked in the yard as a private ship-carpenter, under the name of Peter Michaelof; but he has been often heard to say, that if he had never gone to England, he had remained ignorant of that art. In 1700 he had got together a body of standing forces, consisting of 30,000 foot; and now the vast project he had formed displayed itself in all its parts. He opened his dominions to all intelligent travellers, having first sent the chief nobility of his empire into foreign countries to improve themselves in knowledge and learning, and invited into Russia all the foreigners he could meet with, who were capable of instructing his subjects. This raised many discontents; and the despotic authority he exerted on that occasion was scarcely powerful enough to suppress them. In 1700, being strengthened by the alliance of Augustus king of Poland, he made war on Charles XII. king of Sweden. His first ill success did not deter him; for he used to say, 'my armies must be overcome, but this will at last teach them to conquer.' He afterwards gained considerable advantages; and founded Petersburg in 1703. In 1709 he gained a complete victory over the Swedes at Pultowa. Being in 1712 enclosed by the Turks on the banks of the Pruth, he seemed inevitably lost; and, had not the czarina Catharine bribed the grand vizier, even the czar's prudence could not have effected his deliverance. In 1716 he made a tour through Germany and Holland, and visited the royal academy of sciences at Paris. It would be endless to enumerate all the various establishments for which the Russians are obliged to him. He formed an army on the model of the most military nations: he fitted out fleets in all the four seas which border upon Russia: he caused many strong fortresses to be raised after the best plans; and made convenient harbours: he introduced arts and sciences into his dominions, and freed religion from many superstitious abuses; he built cities, cut canals, &c.; was generous in rewarding, impartial in punishing; faithful, laborious, and humble: yet was he not free from roughness of temper. He had indeed cured himself of excess in drinking; but he has been branded with other vices, particularly cruelty. He certainly caused his unfortunate son prince Alexis to be executed, and was equally severe to his son's friends. He beheaded his own brother-in-law count Lapuchin, brother to his wife Ottokessa Lapuchin whom he had divorced, and uncle to prince Alexis. The prince's confessor also forfeited his head. The remainder of the czar's life was a series of grand projects, labors, and exploits, that seemed to efface the

memory of his excessive severities. He made frequent speeches to his court and to his council. In one he told them that he had sacrificed his son to the welfare of his dominions. He died of the strangary in 1725, and left the world at least with the magnanimity of a hero, if not with the piety of a Christian. Peter was tall of stature, and of a bold and majestic aspect, though sometimes disfigured by convulsions, which altered his features. He conversed with persons in all stations; loved women; and valued himself on drinking large draughts, rather than sipping delicious wines. For a minuter account of his improvements, &c. see RUSSIA, PETERSBURG, &c.

PETER II. emperor of Russia, the son of the unfortunate prince Alexis, was born in 1715; and in 1727 succeeded the empress Catharine I., who had declared him grand duke in 1726. The most remarkable event of his reign was the disgrace of prince Menzikoff. See MENZIKOFF. He died in 1730, aged fifteen.

PETER III., emperor of Russia, was the son of Charles Frederick, duke of Holstein Gottorp, by the princess Anne, daughter of Peter the Great, and was born in 1728. On the death of the empress Elizabeth, in 1762, he succeeded to the throne, but did not long enjoy it; being dethroned the same year by his wife, Catharine II. He died in confinement seven days afterwards, and, as is generally believed, was murdered in a barbarous manner.

PETER III., king of Arragon, succeeded his father James I. in 1276, and turned his arms against Navarre, to which kingdom he laid claim; but failed in the conquest of it. He married the daughter of Manfred king of Sicily; and, to effect the conquest of that island, contrived the horrible massacre of the French, called the Sicilian Vespers. See SICILY. For this crime he and the Sicilians were excommunicated by pope Martin IV. He died at Villefranche in 1282.

PETER THE CRUEL, king of Castile, succeeded his father Alphonsus XI. in 1350, in his sixteenth year, and proved a most barbarous and bloody tyrant; which provoked his subjects to rebel and expel him; but, little to the honor of the English, was restored by their assistance under the command of the brave Black Prince Edward. He was afterwards, however, abandoned by him, and met his just fate from his brother Henry, count of Trastamara, who killed him with his own hand. See SPAIN.

PETER was also the name of four kings of Portugal. See PORTUGAL.

PETER, or DON PEDRO, of Portugal, duke of Coimbra, was the second son of John, king of Portugal, and born 4th March, 1394. He was one of the most accomplished princes of his age; was himself very learned, and was a patron of all learned men. To increase his knowledge, he travelled through the principal countries of Europe, Asia, and Africa, with a train suitable to his quality; of which travels an account was published, but, according to the spirit of the times, loaded with romantic fables. On his return he married Isabel, daughter of count Urgel, and grand-daughter of king Peter IV. He visited England, and was made a knight of the garter, April 22nd, 1417, by his cousin Henry V., who was grandson of John of Gaunt by the father, as Don Pedro was by the mother. In 1440 he was appointed regent of Portugal, during the minority of his cousin Alphonsus V. His regency was so mild as well as just, that the people of Lisbon asked leave to erect a statue to him, which this great prince declined. He governed the kingdom with so much propriety that Portugal was never more respected by the other powers of Europe. He diminished the taxes, maintained the laws in their vigor, and gave the young king an excellent education; who, when he came of age, was so pleased with his conduct, that he married and raised to the throne, the duke's daughter, Donna Isabella, in 1446. Yet all his merits did not prevent the envy of some courtiers, who at last got so much the ear of the monarch as to persuade him that the duke was a traitor: but, upon an inspection of his papers, Alphonsus became convinced of his innocence; and, as the only amends he could now make, ordered his body to be interred with every mark of honor in his own sepulchre.

PETER, THE WILD BOY, a savage, found in the woods near Hamelen, a town in the electorate of Hanover, when king George I. with a party of friends was hunting in the forest of Hertswold. He was supposed to be then about twelve years of age, and had subsisted in those woods, upon leaves, berries, wild plants, bark of trees, &c., from his infancy. In 1726 he was brought over to England, and put under the care of Dr. Arbuthnot, with proper teachers. But though there appeared no natural defect in his organs of speech, he could never be brought to articulate a syllable distinctly. He was afterwards committed to the care of different persons, but never acquired any degree of improvement. He died the 22nd of February, 1785, when he was supposed to be seventy-two years old. He was well made; middle-sized; had no appearance of an idiot, nor any thing particular in his form, except two of his fingers united by a web up to the middle joint. He was delighted with music, and learned to hum a tune. He had a fore-knowledge of bad weather. Lord Monboddo gives a particular description of him, as an instance of his favorite hypothesis, that 'man in a state of nature is a mere animal.'

PETER LE PORT (St.), a market town of Guernsey, situated on the south-eastern part of the island, consists of one long narrow street. It is defended by the Old castle and Castle Cornet. The latter, which commands both the town and harbour, is situated on a rock, separated from the land by an arm of the sea, 600 yards wide, and fordable only at low water. The harbour has a good road for shipping. The pier, a fine work, formed of stones joined together with great regularity, affords not only security to vessels, but being paved on the top, and guarded by parapets, is a pleasant and extensive parade, with a fine prospect of the sea and the neighbouring islands.

PETERBOROUGH, a city of Nassaburgh hundred, Northamptonshire, six miles and a half north by east from Stilton, and eighty-one north from London, is situate on the border of Hunts, on the northern side of the river Nen, which runs

hence through Wisbeach, and is navigable up to the city. It is supposed to have taken its name from a monastery erected about the year 660, dedicated to St. Peter. After the monastery had flourished about 200 years it was totally destroyed by the Danes, and continued in ruins during a century, when Ethelwold, bishop of Winchester, with the assistance of Edgar and his chancellor Adulf, who was afterwards abbot, rebuilt this abbey in the most magnificent and stately manner: the abbots were mitred afterwards, and sat in parliament. At the dissolution of religious houses it was converted into a cathedral, for a bishop, dean, and six canons, eight choristers, a master, two schoolmasters, twenty scholars, six almsmen, and other officers. The cathedral suffered much during the civil war, but was thoroughly repaired some years ago. It is a noble structure, 409 feet long, and 203 broad. Amongst other monuments is one to the memory of the unfortunate Catharine of Arragon, wife of Henry VIII., and another to the memory of Mary Queen of Scots, both of whom were buried here. There is only one parish church, St. John's, besides the cathedral. The streets of Peterborough are regular, but the town has a dull appearance: near the cathedral is a good market-house, over which are held the sessions for the hundred. It has also a well endowed charity school for twenty boys and forty girls, a free-school, and a sunday School. The trade in coal, corn, and timber, is considerable, aud the stocking manufacture is carried on to some extent. On the whole this is the least city, and the poorest bishopric in England; but the jurisdiction called Peterborough Soke or Liberty extends over thirty-two towns and hamlets in the neighbourhood, in all which places the civil magistrates hold their quarter sessions of the peace, &c. The city is governed by a mayor, recorder, six aldermen, and eight common council, and sends two members to parliament. They are chosen by the inhabitants paying scot and lot, in number about 450; and the dean and chapter, who are lords of the manor, appoint the returning officers. Near the city is Caerdyke, an ancient foss made by the Romans for draining the fens. Market on Saturday. Fairs July 10th: October 2d and 3d.

Peterborough, a post-town in Hillsborough county, New Hampshire, watered by the Contoocook, eighteen miles west of Amherst, thirty-eight south-west of Concord, and sixty-four north west of Boston. This is one of the most considerable manufacturing towns in the state, and contains an oil mill, a paper mill, a woollen manufactory, and five cotton manufactories.

Peterborough, a town of Ireland, in Monaghan county, and province of Ulster.

PETERHEAD, a town of Scotland, in the county of Aberdeen, about thirty-three miles north-east of that city. It stands on the most easterly point in Scotland, and from thence due west that kingdom is broadest. It is the nearest land to the northern continent of Europe, and lies within 300 miles of the cape, which is called the Naze of Norway. Through this channel the grand body of the herrings pass in their annual migrations from Shetland and the north seas to the more southern latitudes, attended with the all-devouring cod and ling. The peninsula on which the town is built is connected with the main land on the north-west by an isthmus not more than 800 yards wide. Few harbours in Great Britain are of more importance to navigation than Peterhead, as, in case of violent storms from the easterly points, large vessels embayed betwixt this and the mouth of the Forth have not a port that they can safely take at every time of the tide, that of Aberdeen excepted. If, therefore, they cannot make their way to sea in the teeth of a strong easterly wind, or double this headland that they may gain the Murray frith, they must inevitably come on shore. This harbour lies in a spacious bay, where vessels of any burden may ride in all other winds, and is therefore a frequent rendezvous of shipping which frequent the northern seas. It is defended by a good battery. A considerable trade is carried on directly to the Baltic for deals, iron, hemp, tar, and other articles. There are also manufactures of sewing thread, woollen cloth, and cotton. A mineral well gives, in summer, considerable gaiety to the place; its salutary virtues have long, and very justly, been celebrated. An analysis of this water has been given by Dr. Laing; who found that one pound avoirdupois contains grs. 30¾ muriate of iron; grs. 7 muriate of lime; grs. 3½ carbonate of iron; grs. 2 siliceous earth; grs. 2 sulphate of lime; grs. 13¼ sulphate of soda; grs. 7½ muriate of soda; and 83½ cubic inches of carbonic acid gas. This water has long been in great repute for disorders of the stomach and bowels, gravel, dropsy, nervous affections, female complaints, scrofula, leucophlegmasia, and diseases of general debility. The town is in the form of a cross, and is divided into four districts. The town house is an elegant building at the head of the principal street; sixty feet long, forty broad, with a fine clock, and a spire 100 feet high. It cost about £2000. The late improvements of the piers have cost several thousand pounds. The Keith-Inch divides the harbour into north and south, and the pier here has never been overflowed. The south is considered the more convenient harbour. The commissioners for highland roads and bridges are expending large sums of money in forming a communication between the north and south harbours, and in effecting other great and valuable improvements. Ship-building is carried on to a great extent, and the fisheries are beginning to be much more attended to than formerly. It has many elegant houses on its borders. Near it is a fort and a guard house, with a battery of four twelve-pounders, and four eighteen-pounders. Peterhead is a burgh of barony, governed by a bailie and eight councillors. There are many convenient houses for the accommodation of strangers. There is a ball-room, under which there are two salt-water baths. The church, episcopal chapel, and burgher and antiburgher meetings, are also respectable. Owing to the open and peninsulated situation, the air of this place is esteemed peculiarly pure and healthful; even the fogs rising from the sea are thought to be medicinal: the town is therefore much enlivened by the concourse of company.

PETER-PENCE was an annual tribute of one penny, paid at Rome out of every family at the feast of St. Peter. This Ina, the Saxon king, when he went in pilgrimage to Rome about the year 740, gave to the pope, partly as alms, and partly in reçompence of a house erected in Rome for English pilgrims: and this continued to be paid generally until the time of king Henry VIII., when it was enacted that, from henceforth, no persons shall pay any pensions, Peterpence, or other impositions, to the use of the bishop or see of Rome.

PETERS (Father), a Jesuit, was confessor and counsellor to James II. king of England. This prince dismissed him in 1688, because he was considered as the author of those troubles in which the kingdom was then involved.

PETERS (William), was a native of the west of England, and, after a liberal education, became a student of Exeter College, Oxford; where, in 1788, he took the degree of bachelor of civil law. Previous to this, he studied painting with great assiduity, and obtained a place in the Royal Academy. But, on taking orders, he relinquished the pencil, except by way of amusement, and to oblige some particular friends. He painted historical subjects and portraits with great credit; among the latter was a whole length portrait of George IV. when prince of Wales, for Free-Masons' Hall, in Great Queen Street. Several engravings have been published from his paintings, particularly one of the Soul of an Infant carried to Heaven by Angels. Mr. Peters was presented by the late duke of Rutland, his patron, to a valuable living, and the bishop of Lincoln gave him a prebendal stall in his cathedral. He died at Brasted Place, in Kent, in April, 1814. Before the revolution in France he visited the continent, and while at Paris our ambassador requested the unfortunate Maria Antoinette to allow Mr. Peters to paint the portrait of the dauphin. A council was held upon it, but it was seriously decided that the effluvia of the paint would be injurious to the royal infant, and a refusal, assigning that as a reason, was communicated to his excellency.

PETERS (Charles), author of a Critical Dissertation on the Book of Job, was presented by Elizabeth, lady Mohan, to the living of Boconnoc, in Cornwall, in 1715, and resided there till 1727, when he obtained that of St. Mabyn, in the same county, where he resided till his death in 1777. He was the friend and correspondent of bishop Lowth, who, in his letter to Warburton, speaks highly of him.

PETERS (Hugh), a fanatic in the reign of Charles I., was the son of a merchant of Fowey, Cornwall, and educated at Trinity College, Cambridge. He took the degree of M.A. in 1622; but, it is said, was ultimately expelled his college for bad conduct. He then went on the stage, but afterwards took orders, and was lecturer of St. Sepulchre's, in London. Being here prosecuted for an intrigue with a married female, he absconded to Rotterdam, and became pastor of the English church. He subsequently went to America, where he remained seven years, and then returned to England. He was one of the most useful tools of Cromwell, owing to his talent for the burlesque, and extreme popularity with the soldiers and lower classes. When the king was brought to London for trial, Peters, says Sir Philip Warwick, was 'really and truly his jailor.' He was vehement for the execution of Charles, and suffered, after the Restoration, as a regicide. Some of his Discourses, and his Last Legacy to his Daughter, have been printed.

PETER'S ISLAND (St.), in the lake of Bienne in the Helvetic republic, remarkable for being one of the retreats of Rousseau; whence it has also got the name of Rousseau's Island. It lies towards the south side of the lake, and commands very delightful views. There is only one farmhouse on the island, in an apartment of which Rousseau was lodged.

PETER'S LAKE (St.), a lake of Canada, twenty miles in length and about fifteen in breadth, is formed by the waters of the St. Laurence, aided by several considerable rivers, expanding over a level country. The lake is in general shallow, and in the ship channel there is not usually found more than from eleven to twelve feet water. Vessels of a considerable draught, instead of taking in their whole cargo at Montreal, take in only such part of it as they can carry across this lake, and take the remainder below the lake from river craft.

PETERSBURG, or ST. PETERSBURG, a city of Russia, in the province of Ingria, and capital of the empire. It was founded in 1703 by Czar Peter the Great, whose ambition it was to have a fleet on the Baltic; for which reason he determined to found a city which might become the centre of trade throughout all his dominions. The spot he pitched upon was a low, fenny, uncultivated island, formed by the branches of the Neva, before they fall into the gulf of Finland. In the summer this island was covered with mud; and in winter became a frozen pool, rendered almost inaccessible by dreary forests and deep morasses, the haunts of bears, wolves, and other savage animals. Having taken the fort of Nattebourg, and the town of Neischanz, in 1703, Peter assembled in Ingria above 300,000 men, Russians, Tartars, Cossacs, Livonians, and others, even from the most distant parts of his empire, and laid the foundation of the citadel and fortifications, which were finished in four months, almost in despite of nature. He was obliged to open ways through forests, drain bogs, raise dikes, and lay causeways, before he could found the new city. The workmen were ill-provided with necessary tools and implements: they were even obliged to fetch the earth from a great distance in the skirts of their garments, or in bags made of old mats and rags sewed together. They had neither huts nor houses to shelter them from the severity of the weather: the country, which had been desolated by war, could not accommodate such a multitude with provisions; and the supplies by the lake Ladoga were often retarded by contrary winds. In consequence of these hardships above 100,000 men are said to have perished; nevertheless the work proceeded with incredible vigor and expedition; while Peter, for the security of his workmen, formed a great camp, in such a manner that his infantry continued in Finland, and his cavalry

were quartered in Ingria. The buildings of the city kept pace with the fortress, which is the centre of the town, surrounded on all sides by the Neva; and in little more than a year above 30,000 houses were erected. To people this city Peter invited merchants, artificers, mechanics, and seamen from all the different countries of Europe: he demolished the town of Nieuschants, and brought hither not only the materials of the houses, but the inhabitants themselves. A thousand families were drawn from Moscow; he obliged his nobility to quit their palaces and their villas in and about Moscow, and take up their residence at Petersburg, in a much more cold and comfortless climate. Finally, resolving to remove hither the trade of Archangel, he issued an ordonnance, importing that all such merchandise as had been conveyed to Archangel, to be sold to foreigners, should now be sent to Petersburg, where they should pay no more than the usual duties.

At first many houses were built of timber; but, these being subject to sudden conflagrations, the czar, in 1714, issued an order that all new houses should be walled with brick and covered with tiles. The fort is an irregular hexagon, with opposite bastions. This, together with all the rest of the fortifications, was in the beginning formed of earth only; but in the sequel they were faced with strong walls, and provided with bomb-proof casemates. In the curtain of the fort, on the right hand side, is a noble dispensary. The most remarkable building within the fort is the cathedral, built by the direction of an Italian architect. Petersburg is partly built on little islands, some of which are connected by draw-bridges; and partly on the continent. In the highest part, on the bank of the Neva, the czar fixed his habitation, built of freestone, and situated so as to command a prospect of the greater part of the city. Here likewise is a royal foundry; together with the houses of many noblemen. On the other side of a branch of the Neva stands the czar's summer palace, with a fine garden and orangery. Petersburg is very much subject to dangerous inundations. In 1715 all the bastions and drawbridges were either overwhelmed or carried away.

It was found extremely difficult, if not impracticable, to join the islands and the continent by bridges: and the adjacent country is so barren that the town must be supplied with provisions from a great distance; consequently they are extremely dear. In winter the weather is extremely cold, and hot in the summer. Peter the Great established in the neighbourhood manufactures of linen, paper, saltpetre, sulphur, gunpowder, and bricks, together with mills for sawing timber. He instituted also a marine academy, and obliged every considerable family in Russia to send at least one son or kinsman, between the ages of ten and eighteen, to this seminary. To crown his other plans of reformation, he granted letters patent for founding an academy, upon a very liberal endowment; and, though he did not live to execute this scheme, his empress, who survived him, brought it to perfection. It was modelled on the plans of the Royal Society in London, and the academy of France. The whole city is, at present, divided into four parts: 1. The Admiralty quarter; 2. The Vassali Ostroff, or island; 3. The Island of St. Petersburg; 4. The district of Wiburgh and 5. The Foundry district. These are subdivided into eleven smaller divisions, over each of which is placed a major of police.

Mr. Wraxall calls St. Petersburg in his time 'only an immense outline, which will require future empresses, and almost future ages, to complete.' The streets in general, says Mr. Coxe, are broad and spacious; and three of the principal ones, which meet in a point at the admiralty, and reach to the extremities of the suburbs, are at least two miles in length. Most of them are paved; but a few of them are still suffered to remain floored with planks. In several parts of the metropolis, particularly in the Vassili Ostrof, wooden houses and habitations, scarcely superior to common cottages, are blended with the public buildings; but this motley mixture is far less common than at Moscow, where alone can be formed any idea of an ancient Russian city. The brick houses are ornamented with a white stucco, which has led several travellers to say that they are built with stone; whereas, unless I am greatly mistaken, there are only two stone structures in all Petersburg. The one is a palace, building by the empress upon the banks of the Neva, called the marble palace; it is of hewn granite, with marble columns and ornaments; the other is the church of St. Isaac, constructed with the same materials, but not yet finished. The mansions of the nobility are many of them vast piles of building; they are furnished with great cost, and in the same elegant style as at Paris or London. They are situated chiefly on the south side of the Neva, either in the admiralty quarter, or in the suburbs of Livonia and Moscow, which are the finest parts of the city.' Mr. Coxe calculates the number of inhabitants in Petersburg at 130,000. An equestrian statue of Peter I. in bronze, of a colossal size, the work of M. Falconet, the celebrated French statuary, was cast at the expense of Catharine II. in honor of her great predecessor. Mr. C. gives a particular description of it. The statue was erected on the 27th of August, 1782, upon a pedestal of a most prodigious magnitude; the stone when landed (a labor of six months) being forty-two feet long at the base, thirty-six at the top, twenty-one thick, and seventeen high; a bulk greatly surpassing in weight the most boasted monuments of Roman grandeur. 'The weather,' he adds, 'is extremely changeable in this capital, and the cold is at times extreme. It sometimes happens that coachmen or servants, while they are waiting for their masters, are frozen to death. To prevent these dreadful accidents great fires of whole trees, piled one upon another, are kindled in the court-yard of the palace and the most frequented parts of the town.'

The first Admiralty quarter, is the smallest but most elegant division of Petersburgh. Within its circuit are twenty-three structures of the first magnitude. The Imperial Winter Palace is the most celebrated. It is 450 feet long, 380 broad, and seventy high; and in it is deposited an immense variety of curious and costly works of

all descriptions. Connected with it, by means of a covered gallery, is the hermitage, a spacious edifice, so called from its being the scene of imperial retirement; it was built by Catharine II., and contains a valuable collection of paintings, including the original collection of Houghton house, Norfolk, and a cabinet of natural history. The next building in this quarter of the town worthy of notice is the marble palace already noticed. Few buildings in any part of Europe surpass this in magnificence; it is three stories high, the lowermost of granite, the superstructure of gray marble, decorated with columns and pilasters of a reddish marble. Nothing in the exterior presents itself to the eye but stone or metal; the window-frames are of brass highly polished; the roof rests on iron bars, and is covered with sheet copper. The whole forms an oblong quadrangle. It is situated on the quay of the Neva. It was built originally for Gregory Orloff, one of the favorites of Catharine II., and at his death reverted to that empress. In this quarter are the admiralty, the office for foreign affairs, the post-offices, the senate-house and the loan-bank.

The church of St. Isaac in this quarter was begun by Catharine II. Like the marble palace, the basement is granite, and the superstructure of marble, jasper, and porphyry, both within and without. It was one of the freaks of Paul to finish it with brick. The three straight, long, and beautiful streets of this quarter are called perspectives, because from each may be seen the gilded spire of the admiralty. Of these, the Nevski perspective is the most remarkable: there is in it only one little turn, and it is at least half as wide again as Oxford Street in London. 'The numerous hotels and the shops,' says Storch, 'which are mostly placed together in this street, occasion such a confluence of people, and such a constant bustle, that give it a consequence that is wanting to most parts of St. Petersburg. But, though the Nevski perspective is so remarkable for all these advantages, it becomes infinitely more so in the sight of the philosophical spectator, as the monument of a wise and enlightened toleration. One church here is concatenated with another: Protestants, Catholics, Lutherans, Armenians, and Greeks, have in this street their several churches beside and facing each other.' The equestrian statue of Peter the Great is in this quarter.

The public edifices of the second Admiralty quarter are, the new court stables, the college of medicine, and the opera-house. Two of the most considerable Greek churches are also within this quarter; that of Notre Dame of Cazan, and St. Nicholas. The former merits a particular description. It was originally built in 1734 by the empress Anne; the dome being then of wood, and its architecture ill corresponding to that of the more modern edifices near it. Here the Russian sovereigns, however, returned thanks for the prosperous events of their reigns, and it was determined to rebuild it. The emperor Paul, accordingly, in 1800, ordered plans for this purpose to be submitted to him; but, the death of that emperor occurring, the execution devolved on the late autocrat. It was consecrated 15th of September 1811. In every respect it is magnificent and rich: the door before the principal altar, and the balustrade around it, are of massy silver. The jaspers and marbles of Olonetz and Siberia are employed in great profusion, both in the mosaic and other ornaments. Its exterior is very rich: there is a colonnade of 150 columns of the Corinthian order; their bases and chapiters of cast iron. The portico is adorned with two bronze statues of the archangels, Gabriel and Michael. The principal external door is also of bronze: a perfect copy of the famous door of the cathedral of Florence. Every material employed in the construction and ornamenting of this church is the production of the empire; and almost all the artists, architects, painters, and sculptors were Russians. It is very rich in precious stones, and gold and silver vessels.

Of the third Admiralty quarter, the new bank, perhaps the most elegant building in St. Petersburg, is the chief ornament. Its architecture is simple, but the workmanship of the very first order: its roof is covered with plates of iron. It consists of three distinct compartments: two covered corridors connecting the main building with the sides.

The Vassili Ostroff, the largest island in the Neva, is only inhabited on the eastern or smaller part; the rest is covered with gardens, trees, and morass. Three principal streets traverse it from east to west, intersected at right angles by twelve smaller ones. This division is the seat of commerce and of learning, the exchange and the Academy of Sciences being in it. The building in which the meetings of the latter are held is an elegant structure. The edifices of the land-cadet corps are also in this island. Towards the isle of St. Petersburgh are the custom-house and the new exchange; the latter was finished in the reign of Alexander. The Lutheran church of St. Catharine, designed partly from the model of the temple of Concord, is the most remarkable in this division of the city.

The Petersburgh quarter consists of several islands, little built upon: it contains the first wooden cottage of Peter the Great.

The Wiburg quarter contains, beside the street along the right bank of the Neva, the cottages of the peasantry; there are also two grand mansions within its precincts, besides the great military hospital founded by Peter the Great, and some other public buildings of less magnitude. It also contains a wharf for merchant-ships.

The division of the Foundry is so called from a foundry established there: the most remarkable edifices and establishments in it are, the institute of Catharine for the education of young ladies, the convent of the Resurrection for the same purpose, the great magazine for spirituous liquors and salt, the arsenal, and the Taurida palace. This, originally the pantheon of prince Potemkin, was purchased on his death by Catharine for her autumnal palace: it is remarkable for its vast galleries, its winter garden, its English garden, and its grotto formed of mirrors. The convent of St. Alexander Newsky adorns this quarter: it has, without its precincts, a large dwelling for the archbishop of Petersburg, a

seminary, five churches, a cemetery, and a garden. The mechanism of the bridges over the Neva is so simple that they can be taken to pieces in less than two hours, and this is done as soon as the floating ice at the beginning of the winter comes down: when the ice is fixed, they are again put up; and are taken down a second time at the breaking up of the ice in spring. But the ice, which continues firm, and capable of supporting any weight for five or six months, forms the principal communication in winter between the different quarters. Several plans have been formed for the erection of a permanent bridge across the Neva, but the practicability of such a measure seems doubtful. A wall, parapet, and pavement of hewn granite, stretch along the south bank of the river for three miles. This, which forms the quay, is one of the most striking and stupendous works by which this city is characterised. The triangle of edifices on the left side of the Neva is intersected by three principal canals, forming irregular semicircles, one within another. The Moika forms the smallest semicircle; the Katarina Canal embraces this; and the Fontanka includes both.

The waters of the Neva seem, after the first foundation of the city, to have risen usually every five years. On the 1st of November, 1726, they rose eight feet two inches; on the 2d of October, 1752, eight feet five inches. On September 10th, 1777, there was a dreadful inundation following a violent storm of wind from the west and southwest. In several streets, the torrent was four feet and a half deep, and so powerful that it carried away various buildings and bridges: the Vassili Ostroff and the Island of St. Petersburg particularly suffered. For a short time the river rose ten feet above its general level. After this inundation precautionary measures were taken to warn the inhabitants of the approaching evil. The height of the water is regularly marked: whenever it rises above its banks, at the mouth of the great Neva, notice is given by firings of cannon, repeated at intervals as the danger increases: five cannon are also fired at the Admiralty battery: and from its steeple, by day, flags are displayed, and lanterns by night, the bells of the churches tolling at the same time. These precautions, however, but ill prepared this great city for another calamity of this kind, November 1824. On the night of the 10th, a strong westerly wind impeded the current from the Ladoga Lake; the Neva and the canals rose to an unusual height, and lamps were hung out around the the admiralty steeple to warn the inhabitants not to sleep in their lowest apartments. It was soon apparent that all the admonitions prescribed were necessary; the Neva rose so as to inundate the whole city, and the confusion and destruction became indescribable. 'Vehicles of all descriptions,' says a private letter, 'were now seen hurrying homewards, or to the bridges, or to some rising ground, with the water over the wheels; people were also seen wading through it up to their waists; in a short time, only a courier here and there appeared on horseback, their horses scarcely able to keep their heads above the water. At one o'clock on the 19th nothing was to be seen on the Grand Place and in the streets, but wooden barks, empty boats, sent[illegible] ber, furniture washed from the houses, bread, and various kinds of provisions, all floating in confused masses on the surface; wooden houses were seen floating up the river, most of the inhabitants of which had perished! Even the churchyards experienced an additional desolation. In the Smolensko quarter of the town, the coffins were washed out of their graves, and the dead bodies were cast up from their quiet habitations. Numbers had struggled up pillars, to the tops of the trees, and on the highest eminences, and were gradually saved from the fate of their companions by a few boats, which literally plied above the roofs of many of the houses! An eye-witness says, 'On Saturday the 20th, at day-break, I went out to view the effects of this catastrophe. I found the quay of the Neva blocked up with timber, broken barges, galliots, and vessels of various descriptions, which had carried with them the pillars and lamp-posts of the houses and had broken in the windows, and otherwise damaged the edifices on the quay. The large blocks of granite, of which the parapet is composed, were thrown over. The St. Isaac's, the Toochkoff, and summer garden bridges, were broken away from their anchors, and dispersed and destroyed. Many of the streets were so choked up with their timber as to be almost impassable. In the Vassili Ostroff quarter, where most of the houses are of wood, the destruction was immense; whole dwellings were hurled from their foundations, some of which were found at a considerable distance from the spot on which they stood, with the dead bodies of their unfortunate inhabitants within; others were broken into pieces on the spot, and some of them have been so totally destroyed that not a fragment of them remains.' Wooden barracks with many of their inmates were totally overwhelmed: an entire regiment of carabineers who had climbed up the roofs of one of them all perished! Eight thousand dead bodies had been already found, and multitudes were carried by the retreating waters down the gulf of Finland; many, also, were supposed to remain buried in the ruins of their habitations. Of course many instances of individual affliction, during the rapidity of the inundation, must have occurred; the following seems to us particularly affecting:—A lady and child in a carriage were in a dangerous situation, when a Cossac riding by observed her distress, and stopped; she entreated him at all hazards to save the child; he took it from the carriage window, but in a few minutes his horse slipped, and they both perished; soon afterwards the lady, with her servants, horses, and baggage, were overwhelmed in the waters. When we state the loss of human beings as already ascertained to have amounted to upwards of 8000, it may seem almost unfeeling to think of estimating the destruction of property; but many of those who have escaped the flood are doomed, in the wreck of their all, to combat the more tedious mortality of famine. All the provisions in the city had been more or less damaged, and the frost had set in so severely that any supply from sea was considered almost hopeless. The exchange had been fitted up to receive

4000 persons; and such of the public buildings as escaped were opened for the reception of the homeless The number of these is beyond all present calculation. Our readers may, however, form some faint idea of it from the fact that whole villages in the neighbourhood of the city had almost entirely disappeared: of Emilianowka not a trace remained! The imperial establishments at Cronstadt suffered greatly, and the fleet sustained irreparable damage: a ship of 100 guns was left in the middle of one of the principal streets! In the imperial iron manufactory at Catharinoff 200 workmen perished; and out of eighteen barracks no less than fifteen were washed away. Such are a few, and but a few, of the results of this dreadful calamity. Alexander was a helpless witness of the scene from his palace windows: what a lessen for human ambition! A few years before an emperor, as powerful and as seemingly secure, found the grave of his fortune in the ruins of the other capital. To do him justice he seems to have been deeply afflicted at the spectacle; but indeed what indifferent sojourner would not? A million of roubles have been subscribed from the imperial purse, and a committee appointed for their immediate distribution; the reigning family have personally visited and succoured the miserable survivers; and all that human charity can do, under such a visitation, is in active progress.' The loss of commercial property was immense: of sugar alone 10,800,000 lbs. were damaged.

On an average of ten years, it is calculated, that there are here annually ninety-seven bright days, 104 rainy, seventy-two of snow, and ninety-three unsettled and changeable. The storms are frequent and violent. The greatest heat experienced during the latter sixty years of the eighteenth century was 27°, and the greatest cold 33°, of Reaumur. The spring is very short; the ice of the Neva never breaks up before the 25th of March, nor later than the 27th of April. The earliest time of its freezing is the 20th of October; the latest the 1st of December. It is not till May, however, that winter departs altogether; then the scene suddenly changes, and in a very few days the fields and the trees are green. The summer, in general, is as mild and agreeable as in the south of France, but much more variable and rainy. It is also very short. To it succeeds the most unpleasant season of the year, in no respect resembling the delightful autumns of most of the other countries of Eur. Dark heavy clouds conceal the sun for sever. weeks; incessant rains render the streets almost impassable; and storms frequently occur.

The population of St. Petersburgh amounted, in 1817, to 285,000 souls; but in 1832, was increased to 479,993: of these 55,000 were connected with the land and sea service, and 25,000 were foreigners. There are no important manufactures as yet established; but the commerce is principally in British hands. The imports are English manufactures and colonial produce; wines, fruit, and oils of the south of Europe; fine linens of Holland and Silesia; and the silks, watches, toys, &c., of France. The exports consist chiefly of iron, hemp, potash, flax, tallow, sail cloth, cordage, hog's bristles, furs, tars, isinglass, &c. By means of the canals of Ladoga and Vyshnei Voloshok, which unite the Baltic and the Caspian, goods are conveyed to the capital through a tract of 1434 miles without once landing them. This navigation begins at St. Petersburgh by the Neva, which issues from lake Ladoga. By a canal uniting the Volchof, which falls into the same lake, with the Tvertza, which falls into the Volga, the communication between the Baltic and the Caspian is effected. The canals of Ladoga and Vyshnei Voloshok likewise enable St. Petersburgh to receive the produce of China and Siberia. Petersburgh is 300 miles north-east of Stockholm, 355 north-west of Moscow, 540 N. N. E. of Warsaw, 525 north-east of Copenhagen, and 750 north-east of Vienna.

PETERSBURG, a borough and port of entry, Dinwiddie county, Virginia, on the south bank of the Appomatox, just below the falls, twelve miles above its junction with James River, at City Point, twenty-five miles south by east of Richmond. It contains a court house, a jail, a masonic hall, two banks, one insurance office, an academy which had, in 1818, upwards of 100 students; twelve or fourteen tobacco warehouses, eight flour mills, and five houses of public worship, one for Presbyterians, one for Episcopalians, one for Methodists, and two for Baptists. It is one of the handsomest and most commercial towns in the state, and has a large trade in tobacco and flour. The shipping owned here, in 1816, amounted to 5754 tons. The Appomatox is navigable as far as the town for vessels carrying 100 tons. The borough contains, besides the town of Petersburg, the village of Blandford in Prince George county, and Pocahoubar in Chesterford county.

PETERSFIELD, a borough and market-town of Hampshire, on the Loddon, seventeen miles north-east of Portsmouth, and fifty-five south-west of London. It sends one member to parliament. The town was incorporated by queen Elizabeth, and there is a good market on Saturdays.

PETHERTON, NORTH, a parish in the hundred of the same name, Somerset, three miles south from Bridgewater, and 141 from London. It consists principally of one long street, of which many of the houses are well built; the parish is very extensive, including seventeen villages, and formerly had a considerable corn market on Saturday. Fair 1st May.

PETHERTON, SOUTH, a market town and parish, situate on the river Perret, over which there is a good stone bridge, twelve miles south-east from North Petherton, and 137 from London. The chief manufacture is that of dowlas. Market on Thursday. Fair 5th July.

PETHION DE VILLENEUVE (Jerome), a French revolutionary leader, was originally an advocate at Chartres, and deputy from the Tiers Etat of the bailliage of that city to the States General. In the early part of his public career he acted with Mirabeau, but did not join in all the measures of that demagogue. October, 1789, he was appointed a member of the first Committee of General Safety; and on the 4th of December, 1790, president of the National Assembly. In June following he became president of

the Criminal Tribunal of Paris; and was, together with Barnave and Latour Maubourg, a commissioner to attend the return of Louis XVI. from Varennes. On this occasion Pethion is said to have behaved with little attention to his captives. He was elected to the office of mayor of Paris, November 14th, 1791; and, in consequence of his supposed implication in the riotous attack of the Parisian mob on the Tuilleries on the 20th of June, 1792, was suspended from his functions by the king on the 6th of July, but restored by the Assembly on the 13th. His behaviour on the 10th of August has by some been interpreted as the result of irresolution, and by others as the effect of design, to avoid betraying his real character as an abettor of violence. He now took an active part in the imprisonment of the royal family, and other measures of the ruling party, and became the first president of the Convention. After the death of the king, Pethion was accused of having contributed to the massacres of the Septembrizers; but against this charge he defended himself: he became, however, the peculiar object of jealousy to Robespierre; and, being included in the proscription of the Girondists, was confined in his own house, in the custody of a gendarme, from which he contrived to make his escape, with some other deputies of the same party. He took refuge in the department of Calvados, where they in vain endeavoured to avail themselves of the insurrections against the terrorists: some time after his body, with that of Buzot, one of his confederates, was found in a field half devoured by wolves! He is supposed to have perished with hunger. His works, 4 vols. 8vo., were printed in 1793.

PETIOLE, in botany, the slender stalks that support the leaves of a plant.

PETIOLUS. See BOTANY, Index.

PETION (Alexander Sabes), the late president of the black republic of Hayti, was born at Port-au-Prince, April 2d, 1770. Being the son of a colonist who possessed considerable property, he received a liberal education; and he was scarcely twenty years old when the revolutionary commotions broke out in the island. He was one of the first who took arms; was made an officer of artillery; and obtained the rank of adjutant-general during the civil wars. After the English had left the island, Petion joined Rigaud, a man of color like himself, in opposing the projects of Toussaint L'Ouverture. Rigaud, being unsuccessful, embarked for France with Petion. They both returned to Hayti, however, with general Leclerc, under whom Petion held a colonel's commission. The violent measures adopted by Leclerc and Rochambeau induced Petion to quit the French service; and, forming a union with the negro general Dessalines, assisted by the English, they succeeded in establishing the independence of Hayti in 1804. Petion obtained the government of the western district, while Dessalines, becoming chief of the republic, assumed the title of emperor; until, his conduct having given offence, he was assassinated in 1806. Christophe, his lieutenant, was elected president of Hayti by the senate, but he chose rather to take the title of king, and, behaving in a tyrannical manner, he was obliged to submit to a partition of his dominions. All the southern and western part of the island acknowledged the authority of the senate, by whom Petion was elected president, January 27th, 1807. A civil war now took place between the rivals, but Petion retained his office till his death in 1818, when he was succeeded by his lieutenant, general Boyer.

PETIS DE LA CROIX (Francis), a learned French writer, who was sent into Turkey and Persia, at the age of sixteen, to learn the oriental languages; and became interpreter to Louis XIV., by whom he was employed in various negociations. He wrote part of the life of Louis XIV. in Arabic, a work much esteemed in the east. He died in 1713. He is mentioned with approbation by Voltaire. He understood the Arabic, Turkish, Persian, Tartarian, Ethiopian, and Armenian languages.

PETIT, *adj.* French, *petit.* Small; inconsiderable.

By what small *petit* hints does the mind recover a vanishing motion! *South.*

PETIT TREASON. See TREASON.

PETIT (John), a doctor of the Sorbonne, who very early gained a high character by his eloquent orations pronounced before the university of Paris. He was employed in the famous embassy which was sent from France to Rome, for the purpose of healing the schism in 1407: but what chiefly procured him notoriety was his defence of the murder of Louis, duke of Orleans, only brother to Charles VI.; maintaining, in a public disputation at Paris, the 8th of March 1408, that the murder was lawful, and that 'it is allowable to employ fraud, treason, and every other method, however base, to get rid of a tyrant.' Petit died in 1511, at Hesdin.

PETIT (John Louis), an eminent surgeon, born at Paris in 1674. He acquired such reputation, that in 1726 the king of Poland sent for him to his court, and in 1734 the king of Spain prevailed on him to go into that kingdom. He restored the health of those princes; and they endeavoured to detain him by offering him great advantages, but he chose rather to return to France. He was received into the academy of sciences in 1715; became director of the royal academy of surgery; made several important discoveries; and invented new instruments for the improvement of surgery. He died at Paris in 1750. He wrote an excellent Treatise on the Diseases of the Bones, the best edition of which is that of 1723; and many learned dissertations in the Memoirs of the Academy of Sciences, and in the Memoirs of Surgery, vol. i.

PETIT (Peter), an eminent French mathematician, born at Montluçon in 1589. By Richelieu's influence he became engineer to the king, and intendant of fortifications; and was sent into Italy on the king's business. He wrote several works upon physical and astronomical subjects, and died in 1667.

PETIT (Peter), M. D., a learned French physician, born at Paris in 1617. He graduated at Montpelier; but, preferring literary pursuits to medicine, he became preceptor to the sons of the president Lamoignon. He wrote many pieces in Latin prose and verse; and was deeply versed in Greek and Roman literature and philosophy. He died in 1687, aged seventy.

PETIT (Samuel), a learned Frenchman, born at Nismes in 1564. He studied at Geneva, where he became professor of Greek, Hebrew, and theology. He published Leges Atticæ, Paris, 1615 and 1633.

PETITE GUERRE denotes the operations of detached parties, and the war of posts. See WAR.

PETITIO PRINCIPII, in logic the taking a thing for true, and drawing conclusions from it as such, when it is really false, or at least wants to be proved before any inferences can be drawn from it.

PETIT'ION, *n. s.* & *v. a.* } Lat. *petitio.* Request; prayer; intreaty: to supplicate; request; intreat: petitionarily is an aukward adverb, used by Browne, to signify by way of begging the question: petitionary, supplicatory; containing petitions: petitioner, one who supplicates, or offers a petition.
PETIT'IONARILY, *adv.*
PETIT'IONARY, *adj.*
PETIT'IONER, *n. s.*

Let my life be given at my *petition*, and my people at my request. *Esther* vii. 3.

Thou didst choose this house to be called by thy name, and to be a house of prayer and *petition* for thy people. 1 *Mac.* vii.

We must propose unto all men certain *petitions* incident and very material in causes of this nature. *Hooker.*

Petitionary prayer belongeth only to such as are in themselves impotent, and stand in need of relief from others. *Id.*

My next poor *petition*
Is, that his noble grace would have some pity
Upon my wretched women. *Shakspeare.*
Pardon thy *petitionary* countrymen. *Id.*
You have *petitioned* all the gods
For my prosperity. *Id. Coriolanus.*

When you have received the *petitions*, and it will please the *petitioners* well to deliver them into your own hand, let your secretary first read them, and draw lines under the material parts. *Bacon.*

It is our base *petitionary* breath
That blows 'em to this greatness. *Ben Jonson.*

This doth but *petitionarily* infer a dextrality in the heavens, and we may as reasonably conclude a right and left laterality in the ark of Noah. *Browne.*

It was no wonder that they, who at such a time could be corrupted to frame and deliver such a *petition*, would not be reformed by such an answer. *Dryden.*

His woes broke out, and begged relief
With tears, the dumb *petitioners* of grief. *Id.*

Their prayers are to the reproach of the *petitioners*, and to the confusion of vain desires. *L'Estrange.*

What pleasure can it be to be encumbered with dependencies, thronged and surrounded with *petitioners*? *South.*

The Roman matrons presented a *petition* to the fathers; this raised so much raillery upon the *petitioners* that the ladies never after offered to direct the lawgivers of their country. *Addison.*

I return only yes or no to questionary and *petitionary* epistles of half a yard long. *Swift.*

We must not only send up *petitions* and thoughts now and then to heaven, but must go through all our worldly business with a heavenly spirit. *Law.*

Methods had been taken to persuade the queen so strongly of the truth of it, that she for a long time refused to hear any one of those who *petitioned* for his life. *Johnson.*

The Hampshire *petition* arose out of the election occasioned by the dissolution. *Canning.*

PETITION, in law, is a supplication made by an inferior to a superior, and especially to one having jurisdiction. It is used for that remedy which the subject has to help a wrong done by the king, who hath a prerogative not to be sued by writ: In which sense it is either general, that the king do him right; whereupon follows a general indorsement upon the same, Let right be done the party: Or it is special, when the conclusion and indorsement are special for this or that to be done, &c. By statute, the soliciting, laboring, or procuring the putting the hands or consent of above twenty persons to any petition to the king or either house of parliament, for alterations in church or state, unless by assent of three or more justices of the peace of the county, or a majority of the grand jury at the assizes or sessions, &c., and repairing to the king or parliament to deliver such petition with above the number of ten persons, is subject to a fine of £100 and three months' imprisonment, being proved by two witnesses within six months, in the court of B. R. or at the assizes, &c. And, if what is required by this statute be observed, care must be taken that petitions to the king contain nothing which may be interpreted to reflect on the administration; for, if they do, it may come under the denomination of a libel: and it is remarkable that the petition of the city of London for the sitting of a parliament was deemed libellous, because it suggested that the king's dissolving a late parliament was an obstruction of justice; also the petition of the seven bishops sent to the Tower by James II. was called a libel, &c. To subscribe a petition to the king, to frighten him into a change of his measures, intimating that if it be denied many thousands of his subjects will be discontented, &c., is included among the contempts against the king's person and government, tending to weaken the same, and is punishable by fine and imprisonment.

PETITION OF RIGHT was a celebrated parliamentary declaration of the liberties of the people assented to by king Charles I., in the beginning of his reign: in which it is enacted that none should be compelled to make or yield any gift, loan, benevolence, tax, and such like charge, without consent by act of parliament; nor, upon refusal so to do, be called to make answer, take any oath not warranted by law, give attendance, or be confined, or otherwise molested concerning the same, &c. And that the subject should not be burdened by the quartering of soldiers or mariners; and all commissions for proceeding by martial law to be annulled, and none of like nature issued thereafter, lest the subject (by color thereof) be destroyed or put to death, contrary to the laws of the land, &c. See stat. 3 Car. I. cap. 1.

PETITOT (John), a curious painter in enamel born at Geneva in 1609. He arrived to a degree of perfection that may almost be accounted inimitable. He, however, only painted the heads and hands of the figures; the hair, grounds, and drapery, being executed by Bordier, his brother-in-law. These two artists had the credit of laboring together for fifty years in the greatest harmony. He painted the portraits of Charles I. and his family. He then went to Paris, where he was highly favored by Louis XIV. and acquired an

ample fortune. Being a Protestant, the revocation of the edict of Nantes obliged him to retire to Geneva; but, settling soon after at Veray in Bern, he passed the remainder of his life in affluence. He died in 1691, and had seventeen children; of whom one took to painting, and settled at London, where he gained reputation; but was much inferior to his father. Petitot may be called the inventor of painting portraits in enamel. He made use of gold and silver plates, and seldom enamelled on copper. His price was twenty louises a head, which he soon raised to forty.

PETITPIERRE (Ferdinand Oliver), an eminent Protestant French divine, who flourished about the beginning of the eighteenth century. He was minister of a church in Chaux De Fond, and published a work entitled Thoughts on the Divine Goodness; divided into three chapters, containing the definition, proofs, and consequences, of the infinite goodness of God. This work has gone through many editions, and has been translated into English and other languages. But one of the chief tenets included in it, being, that the state of future punishment (which, however, he places in a most terrific point of view) is not eternal, and that all men will be finally happy, he was first prohibited from preaching, and afterwards deposed. A translation of this work was published at Edinburgh in 1799, 12mo.

PETIVER (James), F. R.S., an eminent English botanist, contemporary with Plukenet. He was bred an apothecary with Mr. Feltham, of St. Bartholomew's hospital; settled in Aldersgate Street, and became apothecary to the Charter House. He made a collection in natural history, so valuable that Sir Hans Sloane offered him £4000 for it before his death, and purchased it afterwards. He was elected F. R. S. and assisted Ray in the second volume of his History of Plants. He engaged the captains and surgeons of ships to bring him home specimens of foreign plants; and enabled them to select proper objects by printed directions. He wrote 1. Musæi Petiveriani centuriæ decem; 1692—1703; 8vo. 2. Gazophylacii Naturæ et Artis decades decem; fol. 1702, with 100 plates. 3. A Catalogue of Mr. Ray's English Herbal; fol. 1713 to 1715. 4. Many small tracts enumerated in Dr. Pultney's book. 5. Many papers in the Philosophical Transactions. 6. Plantæ rariores Chinenses, Madraspatanæ, et Africanæ, &c., in Ray's 3rd vol. His works were reprinted in 1764, in 2 vols. fol. and 1 vol. 8vo. He died the 20th of April 1718; and his funeral was honored by the literati.

PETIVERIA, in botany, Guinea-hen weed, a genus of the tetragynia order and hexandria class of plants; and in the natural method ranking under the twelfth order, holoraceæ: CAL. tetraphyllous: COR. none, and but one SEED, with reflexed awns at the top.

PETLAD, a town in the province of Gujrat, Hindostan, sixteen miles E. N. E. from Cambay. Lat. 22° 27′ N., long. 73° E. The caste of Dhers are here exempt from the general duty imposed on them in the rest of the province, of serving as guides; but a stranger may here seize on the first person he meets and compel him to act as such.

PETRA, a town of Greece, on the coast of Illyricum near Dyrrhachium and the mouth of the Panyasus. Cæs. Lucian.

PETRA, a town of Mædica, a district of Thrace, lying towards Macedonia; but in what part of Macedonia Livy does not say.

PETRA, PETRÆA, or PETRINA (urbs being understood), an inland town of Sicily, south-west of Engyum; now called Petraglia. Cluverius, Ptol. Sil. Ital.

PETRA was also the name of four other ancient towns: viz. 1. in Pieria in Macedon—Liv. Cic. 2. Near Dyrrhachium.—Lucan. Cæs. 3. In Elis: and, 4. Near Corinth.

PETRA JECKTAEL, a town of the Amalekites, near the Adscensus Scorpionis, and the valley of Salt in the south of Judea; afterwards in the possession of the Edomites, after destroying the Amalekites. 2 Kings xiv.; Judges i.

PETRA RECEM, or REKEM, so called from Rekem king of the Midianites, slain by the Israelites, Numb. xxxi., a town of Arabia, formerly called Arce or Petra: the capital of Arabia Petræa.—Josephus. Ptolemy places it in long. 66° 45′ from the Fortunate Islands, and lat. 30° 20′. It declines eighty miles to the south of the parallel of Jerusalem, and thirty-six miles, more or less, from its meridian to the east; Josephus says that the mountain on which Aaron died stood near Petra; which Strabo calls the capital of the Nabatæi; at the distance of three or four days' journey from Jericho. This Petra seems to be the Sela of Isaiah xvi. 1, and xlii. 11, from the Hebrew name, Petra, a rock, but some imagine Petra to be no older than the time of the Macedonians.

PETRARCH (Francis), a celebrated Italian poet, born at Arezzo in 1304. He studied grammar, rhetoric, and philosophy, four years at Carpentras; whence he went to Montpelier, where he studied the law. His father and mother dying of the plague at Avignon, he returned to that city, when twenty-two years of age, to settle his domestic affairs, and purchased a country house in a very solitary but agreeable situation, called Vaucluse; where he first saw the beautiful Laura, of whom he became enamoured, and whom he has immortalised in his poems. He travelled into France, the Netherlands, and Germany; and, at his return to Avignon, entered into the service of pope John XXII., who employed him in several important affairs. Petrarch expected some considerable posts; but, being disappointed, he applied himself entirely to poetry; in which he met with such applause, that in the same day he received letters from Rome and Paris inviting him to receive the poetic crown. He preferred Rome, and received that crown from the senate and people on the 8th of April 1341. His love of solitude at length induced him to return to Vaucluse; but, after the death of the beautiful Laura, Provence became insupportable to him, and he returned to Italy in 1352; when, being at Milan, Galeas Viceconti made him counsellor of state. Petrarch spent almost all the rest of his life in travelling to and from the different cities in Italy. He

was archdeacon of Parma, and canon of Padua; but never received the order of priesthood. All the princes and great men of his time gave him public marks of their esteem; and while he lived at Arcqua, three miles from Padua, the Florentines sent Boccace to him with letters, inviting him to Florence, and informing him that they restored to him all the estate of which his father and mother had been deprived during the dissentions between the Guelphs and the Gibelines. He died a few years after at Arcqua, in 1374. He wrote many works that have rendered his memory immortal; printed in four vols. folio. His life has been written by several authors; particularly by Mrs. Dobson, in 2 vols. 8vo. 'The works of Petrarch,' says Mr. Tytler, 'bear evidence of his abilities as a politician, theologian, and philosopher, and it is in these characters that he appears to have been chiefly distinguished by his contemporaries, but it is not on these foundations that the lasting structure of his fame has been reared. It is to those incomparable verses, in which he has celebrated the accomplishments and bewailed the fate of the beautiful Laura, that Petrarch has been indebted for his permanent reputation. The history of the poet's passion for his lovely mistress must ever be regarded as forming the most interesting portion of his annals. His character, in fact, took its tone from that predominant affection, which influenced his studies, his habits of life, and all his pursuits and occupations. A love so pure, so ardent, and so lasting, is difficult to be paralleled in the history of human nature. Petrarch was the passionate admirer of Laura for twenty-one years while she was in life, and with unabated ardor of affection he is said to have bewailed her loss for twenty-six years after her death.

PETRASTRUMIA, a town of Naples in Principato Ultra; nine miles south of Benevento.

PETRATSCHEN, a town of Prussian Lithuania, four miles W. S. W. of Ragnitz.

PETRE, *n. s.* Lat. *petra*, a stone. Nitre; salt-petre. Not of modern use.

Powder, made of impure and greasy *petre*, hath but a weak emission, and gives but a faint report. *Browne.*

The vessel was first well nealed to prevent cracking, and covered to prevent the falling in of any thing that might unseasonably kindle the *petre*. *Boyle.*

Nitre, while it is in its native state, is called *petre*-salt, when refined salt-*petre*. *Woodward.*

PETRE, or SALTPETRE, in chemistry. See CHEMISTRY, Index, and NITRE.

PETREA, in botany, a genus of the angiospermia order and didynamia class of plants; natural order fortieth, personatæ: CAL. quinquepartite; very large and colored: COR. rotaceous: CAPS. bilocular, and situated in the bottom of the calyx: SEED solitary. There is only one species, a native of New Spain. It rises to fifteen or sixteen feet, with a woody stalk covered with gray bark, sending out several long branches. These have a whiter bark than the stem, and are garnished with leaves at each joint, which, on the lower part of the branches, are placed by three round them; but higher up they are rough, and have a rough surface. The flowers are produced at the ends of the branches, in loose bunches nine or ten inches long, each flower standing on a slender flower-stalk about an inch long: the empalement of the flower is composed of five narrow obtuse leaves about an inch long, which are of a fine blue color, and much more conspicuous than the petals which are white, and not more than half the length of the empalement. The plant is propagated by seeds procured from the places where they are natives, and of which very few are good. The seeds must be sown in a good hot-bed; and, when the plants come up, they should all be planted in a separate small pot filled with light loamy earth, and plunged into a hot-bed of tanners' bark, where they should afterwards constantly remain.

PETRES'CENT, *adj.*
PETRIFAC'TION, *n. s.*
PETRIFAC'TIVE, *adj.*
PETRIFICA'TION, *n. s.*
PETRIF'IC, *adj.*
PET'RIFY, *v. a.* & *v. n.*
Lat. *petrescens*, *petrifio*. Growing or becoming stone; petrifaction, the act of turning to stone, or state of being so turned: petrifactive and petrific mean having the power of changing into stone or to form stone: petrification, the body formed by the change of matter into stone: to petrify is to convert into stone: hence to make hard or callous; stupify: as a verb neuter to become stone.

Though their souls be not yet wholly *petrified*, yet every act of sin makes gradual approaches to it. *Decay of Piety.*

Winter's breath,
A nitrous blast that strikes *petrifick* death. *Savage.*

The aggregated soil,
Death with his mace *petrifick*, cold and dry,
As with a trident, smote. *Milton's Paradise Lost.*

Its concretive spirit has the seeds of *petrifaction* and gorgon within itself. *Browne.*

There are many to be found, which are but the lapidescences and *petrifactive* mutation of bodies. *Id.*

A cave, from whose arched roof there dropped down a *petrescent* liquor, which oftentimes before it could fall to the ground congealed. *Boyle.*

In these strange *petrifications*, the hardening of the bodies seems to be effected principally, if not only, as in the induration of the fluid substance of an egg into a chick, by altering the disposition of their parts. *Id.*

Like Niobe we marble grow,
And *petrify* with grief. *Dryden.*

A few resemble *petrified* wood. *Woodward.*

Look over the variety of beautiful shells, *petrifactions*, ores, minerals, stones, and other natural curiosities. *Cheyne.*

Full in the midst of Euclid dip at once,
And *petrify* a genius to a dunce. *Pope.*

Who stifle nature, and subsist on art,
Who coin the face, and *petrify* the heart. *Young.*

PETRIDIA, in the old system of mineralogy, a genus of scrupi, of a plain uniform texture; of no great variety of colors, and emulating the external form of pebbles.

PETRIFACTION, in physiology, denotes the conversion of wood, bones, and other substances,

principally animal or vegetable, into stone. These bodies are more or less altered from their original state, according to the different substances they have lain buried among in the earth; some of them have suffered very little change, and others being so highly impregnated with crystalline, sparry, pyritical, or other extraneous matter, as to appear mere masses of stone, or lumps of the matter of the common pyrites; but they are generally of the external dimensions, and retain more or less of the internal figure, of the bodies into the pores of which this matter has made its way. The animal substances thus found petrified are chiefly sea-shells; the teeth, bony palates, and bones of fish; the bones of land animals, &c. These are found variously altered, by the insinuation of stony and mineral matter into their pores; and the substance of some of them is now wholly gone, there being only stony, sparry, or other mineral matter remaining in their shape and form.

Respecting the manner in which petrifaction is accomplished we know little. It has been thought by many philosophers that this was one of the rare processes of nature; and accordingly such places as afforded a view of it have been looked upon as great curiosities. However, it is now discovered that petrifaction is exceedingly common; and that every kind of water carries in it some earthy particles, which, being precipitated from it, become stone of a greater or less degree of hardness; and this quality is most remarkable in those waters which are much impregnated with selenitic matter. Of late, it has also been found that iron contributes greatly to the process; and this it may do by its precipitation of any aluminous earth which happens to be dissolved in the water by means of an acid. The calcareous kinds of earth, also, by being soluble in water without any acid, must contribute very much to the process of petrifaction, as they are capable of a great degree of hardness by means of being joined with fixed air, on which depends the solidity of our common cement or mortar used in building houses. The name petrifaction belongs only to bodies of vegetable or animal origin; and to determine their class and genus, or even species, it is necessary that their texture, their primitive form, and in some measure their organisation, be still discernible. Thus we ought not to place the stony kernels, moulded in the cavity of some shell, or other organised body, in the rank of petrifactions properly so called.

Petrifactions of the vegetable kingdom are almost all either gravelly or siliceous; and are found in gullies, trenches, &c. Those which strike fire with steel are principally found in sandy fissures; those which effervesce in acids are generally of animal origin, and are found in the horizontal beds of calcareous earth, and sometimes in beds of clay or gravel; in which case the nature of the petrifaction is different. As to the substances which are found in gypsum, they seldom undergo any alteration, either with respect to figure or composition, and they are very rare. Organised bodies, in a state of petrifaction, generally acquire a degree of solidity of which they were not possessed before they were buried in the earth; and some of them are often full as hard as the stones or matrices in which they are enveloped. When the stones are broken, the fragments of petrifications are easily found, and easily distinguished. There are some organised bodies, however, so changed by petrifaction as to render it impossible to discover their origin. That there is a matter more or less agitated, and adapted for penetrating bodies, which crumbles and separates their parts, draws them along with it, and disperses them here and there in the fluid which surrounds them, is a fact of which nobody seems to entertain any doubt. Indeed we see almost every substance, whether solid or liquid, insensibly consume, diminish in bulk, and at last, in the lapse of time, vanish and disappear. A petrified substance, strictly speaking, is nothing more than the skeleton, or perhaps image of a body which has once had life, either animal or vegetable, combined with some mineral. Thus petrified wood is not in that state wood alone. One part of the compound or mass of wood, having been destroyed by local causes, has been compensated by earthy and sandy substances, diluted and extremely minute, which the waters surrounding them had deposited while they themselves evaporated. These earthy substances, being then moulded in the skeleton, will be more or less indurated, and will appear to have its figure, its structure, its size, in a word, the same general characters, the same specific attributes, and the same individual differences. Farther, in petrified wood, no vestige of ligneous matter appears to exist. We know that common wood is a body in which the volume of solid parts is greatly exceeded by that of the pores. When wood is buried in certain places, lapidific fluids, extremely divided and sometimes colored, insinuate themselves into its pores and fill them up. These fluids are afterwards moulded and condensed. The solid part of the wood is decomposed and reduced into powder, which is expelled without the mass by aqueous filtrations. In this manner the places which were formerly occupied by the wood are now left empty in the form of pores. This operation of nature produces no apparent difference, either of the size or of the shape; but it occasions, both at the surface and in the inside, a change of substance, and the ligneous texture is inverted; that is to say, that which was pore in the natural wood, becomes solid in that which is petrified; and that which was solid or full in the first state becomes porous in the second. In this way, says M. Musard, petrified wood is much less extended in pores than solid parts, and at the same time forms a body much more dense and heavy than the first. As the pores communicate from the circumference to the centre, the petrifaction ought to begin at the centre, and end with the circumference of the organic body subjected to the action of the lapidific fluids. Such is the origin of petrifactions. They are organised bodies which have undergone changes at the bottom of the sea or the surface of the earth, and which have been buried by various accidents at different depths under the ground. To understand properly the detail of the formation of petrified bodies it is necessary to be well acquainted with all their

constituent parts. Let us take wood for an example. Wood is partly solid and partly porous. The solid parts consist of a substance, hard, ligneous, and compact, which forms the support of the vegetable; the porous parts consist of vessels or interstices which run vertically and horizontally across the ligneous fibres, and which serve for conducting air, lymph, and other fluids. Among these vessels, the trachiæ, which rise in spiral forms, and which contain only air, are easily distinguished. The cylindric vessels, some of which contain lymph and others the succus proprius, are full only during the life of the vegetable. After its death they become vacant by the evaporation and absence of the fluids with which they were formerly filled. All these vessels, whether ascending or descending, unite with one another, and form great cavities in the wood and in the bark. According to Malphigi and Duhamel, the ligneous fibres are themselves tubular, and afford a passage to certain liquors; in short, the wood and bark are interspersed with utriculi of different shapes and sizes. The augmentation of the trunk in thickness, according to Malpighi, is accomplished by the annual addition of a new exterior covering of fibres and of trachiæ. Others think that a concentric layer of sap wood is every year hardened, whilst a new one is formed from the bark. But it is on all sides agreed, that the concentric layers of wood are distinct from one another, because, at the point of contact betwixt any two of them, the new vessels, as well as new fibres, are more apparent and perceptible than they are in any other place.

In order, says M. Bertrand, in his Dictionnaire des Fossiles, that a body should become petrified, it is necessary that it be—1. Capable of preservation under ground: 2. That it be sheltered from the air and running water (the ruins of Herculaneum prove that bodies which have no connexion with free air preserve themselves untouched and entire). 3. That it be secured from corrosive exhalations. 4. That it be in a place where there are vapors or liquids, loaded either with metallic or stony particles in a state of dissolution, and which, without destroying the body, penetrate it, impregnate it, and unite with it, in proportion as its parts are dissipated by evaporation.

M. Mongez explains the petrifaction of vegetables as follows:—In proportion to the tenderness and bad quality of wood, it imbibes the greater quantity of water; therefore this sort will unquestionably petrify more easily than that which is hard. It is thought that all the petrified wood so often found in Hungary has been originally soft, such as firs or poplars. Suppose a piece of wood buried in the earth: if it be very dry it will suck up the moisture which surrounds it like a spunge. This moisture, by penetrating it, will dilate all the parts of which it is composed. The trachiæ, or air vessels, will be filled first, and then the lymphatic vessels, and those which contain the succus proprius, as they are likewise empty. The water which forms this moisture keeps in dissolution a greater or a less quantity of earth; and this earth, detached, and carried along in its course, is reduced to such an attenuated state, that it escapes our eyes and keeps itself suspended, whether by the medium of fixed air or by the motion of the water. Such is the lapidific fluid. Upon evaporation, or the departure of the menstruum, this earth, sand, or metal, again appears in the form of precipitate or sediment in the cavities of the vessels, which by degrees are filled with it. This earth is there moulded with exactness: the lapse of time, the simultaneous and partial attraction of the particles, make them adhere to one another; the lateral suction of the surrounding fibres, the obstruction of the moulds, and the hardening of the moulded earth, become general; and there consists nothing but an earthy substance which prevents the sinking of the neighbouring parts. If the deposit is formed of a matter in general pretty pure, it preserves a whiter and clearer color than the rest of the wood; and as the concentric layers are only perceptible and distinct in the wood, because the vessels are there more apparent on account of their size, the little earthy cylinders, in the state of petrified wood, must be there a little larger, and consequently must represent exactly the turnings and separations of these layers. At the places of the utriculi globules are observed, of which the shapes are as various as the moulds in which they are formed. The anastomoses of the proper and lymphatic vessels form, besides, points of support or reunion for this stony substance. With regard to holes formed by worms in any bits of wood before they had been buried in the earth, the lapidific fluid, in penetrating these great cavities, deposits there as easily the earthy sediment, which is exactly moulded in them. These vermiform cylinders are somewhat less in bulk than the holes in which they are found, which is owing to the retreat of the more refined earth, and to its drying up. Let any one represent to himself this collection of little cylinders, vertical, horizontal, inclined in different directions, the stony masses of utriculi and of anastomoses, and he will have an idea of the stony substance which forms the ground work of petrifaction. Hitherto not a single ligneous part is destroyed; they are all existing, but surrounded on every side with earthy deposite; and that body which, during life, was composed of solid and of empty parts, is now entirely solid; its destruction and decomposition do not take place till after the formation of these little deposits. In proportion as the water abandons them it penetrates the ligneous substance, and destroys it by an insensible fermentation. The woody fibres, being decomposed, form in their turn voids and interstices, and there remains in the whole piece nothing but little stony cylinders. But in proportion as these woody fibres disappear, the surrounding moisture, loaded with earth in the state of dissolution, does not fail to penetrate the piece of wood, and to remain in its new cavities. The new deposit assumes exactly the form of the decomposed fibres; it envelopes in its turn the little cylinders which were formed in their cavities, and ends by incorporating with them. We may suppose here that, in proportion as it decomposes, there is a reaction of the ligneous part against the lapidific fluid: from this reaction a

color arises which stains more or less the new deposit; and this color will make it easily distinguishable from that which has been laid in the inside of the vessels. In all petrified wood this shade is generally perceptible. We have then, says M. Mongez, four different epochs in the process by which nature converts a piece of wood into stone, or, to speak more justly, by which she substitutes a stony deposit in its place:—1. Perfect vegetable wood, that is to say, wood composed of solid and of empty parts, of ligneous fibres, and of vessels. 2. Wood having its vessels obstructed and choked up by an earthy deposit, while its solid parts remain unaltered. 3. The solid parts, attacked and decomposed, forming new cavities betwixt the stony cylinders, which remain in the same state, and which support the whole mass. 4. These new cavities filled with new deposits, which incorporate with the cylinders, and compose nothing else but one general earthy mass representing exactly the piece of wood. Among the petrifactions of vegetables called dendrolites are found parts of shrubs, stems, roots, portions of the trunk, some fruits, &c. We must not, however, confound the impressions of mosses, ferns, and leaves, nor incrustations, with petrifactions. Among the petrifactions of animals, we find shells, crustaceous animals, polyparii, some worms, the bony parts of fishes and of amphibious animals, few or no real insects, rarely birds and quadrupeds, together with the bony portions of the human body. The cornua ammonis are petrified serpents; and with regard to figured and accidental bodies, these are lusus naturæ.

It is a question of great importance among naturalists to know the time which nature employs in petrifying bodies of an ordinary size. M. le Chevalier de Baillu, director of the cabinet of natural history of his imperial majesty of Austria, and some other naturalists, had, several years ago, the idea of making a research which might throw some light upon it. His majesty being informed by the unanimous observations of modern historians and geographers that certain pillars which are seen in the Danube in Gervia, near Belgrade, are remains of the bridge which Trajan constructed over the river, presumed that these pillars were petrified, and that they would furnish some information with regard to the time which nature employs in changing wood into stone. He therefore ordered his ambassador at the court of Constantinople to ask permission to take up from the Danube one of the pillars of Trajan's bridge. The petition was granted, and one of the pillars was accordingly taken up; from which it appeared that the petrifaction had only advanced three-fourths of an inch in the space of 1500 years. There are, however, certain waters in which this transmutation is more readily accomplished. Petrifactions appear to be formed more slowly in earths that are porous and in a slight degree moist, than in water itself. When the foundations of the city of Quebec in Canada were dug up, a petrified savage was found among the last beds to which they proceeded. There was no idea of the time at which this man had been buried under the ruins, but his quiver and arrows were still well preserved. In digging a lead mine in Derbyshire, in 1744, a human skeleton was found among stags' horns. It is impossible to say how many ages this carcase had lain there. In 1695 the entire skeleton of an elephant was dug up near Tonne in Thuringia. Some time before this epoch the petrified skeleton of a crocodile was found in the mines of that country. We might cite another fact equally curious, which happened at the beginning of the last century. John Munte, curate of Slægarp in Scania, and several of his parishioners, wishing to procure turf from a drained marshy soil, found, some feet below ground, an entire cart, with the skeletons of the horses and carter. It is presumed that there had formerly been a lake in that place, and the carter, attempting to pass over on the ice, had by that means probably perished. In fine, wood, partly fossil and partly coally, has been found at a great depth, in the clay of which tile was made for the abbey of Fontenay. Fossil wood was also discovered in the middle of the last century, at the depth of seventy-five feet in a well betwixt Issi and Vauvres near Paris. This wood was in sand betwixt a bed of clay and pyrites, and water was found four feet lower than the pyrites. M. de Laumont, inspector-general of the mines, says (Journal de Physique, Mai 1736) that in the lead mine at Pontpean near Rennes, is a fissure, perhaps the only one of its kind. In this fissure sea-shells, rounded pebbles, and an entire beech, have been found 240 feet deep. This beech was laid horizontally in the direction of the fissure. Its bark was converted into pyrites, the sap-wood into jet, and the centre into coal. Many pieces of petrified wood are found in different departments of France, and particularly in that of Mont Blanc, the ci-devant Savoy. In Cobourg in Saxony, and in the mountains of Misnia, trees of a considerable thickness have been taken from the earth, which were entirely changed into a very fine agate, as also their branches and their roots. In sawing them the annual circles of their growth have been distinguished. Pieces have been taken up, on which it was distinctly seen that they had been gnawed by worms; others bear visible marks of the hatchet. In fine, pieces have been found which were petrified at one end, while the other still remained in the state of wood fit for being burned. It appears then that petrified wood is a great deal less rare in nature than is commonly imagined.

Mr. Sinclair of Ulbster, M. P., lately transmitted to professor Jameson, for the Edinburgh College Museum, a collection of *petrified fishes*, found by him in the old red sandstone formation in the neighbourhood of Thurso; and the minister of South Ronaldshay, one of the Orkneys, lately deposited in the College Museum specimens of the same description, collected by himself in the old red sandstone of that island. These fishes are also found in a variety of sandstone flag now extensively imported into Edinburgh from Caithness.

Cronstedt has excluded petrifactions from any place in the body of his system of mineralogy, but takes notice of them in his appendix. He distinguishes them by the name of mineralia

larvata, and defines them to be 'mineral bodies in the form of animals or vegetables.' The most remarkable observations concerning them, according to Kirwan, who differs in some particulars from Mongez, are as follow:—1. Those of shells are found on or near the surface of the earth; those of fish deeper; and those of wood deeper still. Shells in substance are found in vast quantities, and at considerable depths. 2. The substances most susceptible of petrifaction are those which most resist the putrefactive process; of which kind are shells, the harder kinds of wood, &c.; while the softer parts of animals, which easily putrefy, are seldom met with in a petrified state. 3. They are most commonly found in strata of marl, chalk, lime-stone, or clay; seldom in sandstone; still more seldom in gypsum; and never in gneiss, granite, basaltes, or schoerl. Sometimes they are found in pyrites, and ores of iron, copper, and silver; consisting almost always of that kind of earth or other mineral which surrounds them; sometimes of silex, agate, or cornelian. 4. They are found in climates where the animals themselves could not have existed. 5. Those found in slate or clay are compressed and flattened

The different species of petrifactions, according to Cronstedt, are, I. Terræ larvatæ; extraneous bodies changed into a limy substance, or calcareous changes. These are, 1. Loose or friable; 2. Indurated. The former are of a chalky nature, in form of vegetables or animals; the second filled with solid limestone in the same forms. Some are found entirely changed into a calcareous spar. All of them are found in France, Sweden, and other countries in great plenty. On these petrifactions Cronstedt observes, that shells and corals are composed of limy matter even when still inhabited by their animals, but they are classed among the petrifactions as soon as the calcareous particles have obtained a new arrangement; for example, when they have become sparry; filled with calcareous earth either hardened or loose, or when they lie in the strata of the earth. 'These,' says he, 'form the greatest part of the fossil collections which are so industriously made, often without any regard to the principal and only use they can be of, viz. that of enriching zoology. Mineralogists are satisfied with seeing the possibility of the changes the limestone undergoes in regard to its particles; and also with receiving some insight into the alteration which the earth has been subject to, from the state of the strata which are now found in it.' The calcined shells, where the petrifactions are of a limy or chalky nature, answer extremely well as a manure; but the indurated kind serve only for making grottoes. Gypseous petrifactions are extremely rare: however, Chardin informs us, that he had seen a lizard enclosed in a stone of that kind in Persia. II. Larvæ, or bodies changed into a flinty substance. These are all indurated, and are of the following species: 1. Cornelians in form of shells from the river Tomm in Siberia. 2. Agate in form of wood: a piece of which is said to be in the collection of the count de Tessin. 3. Coralloids of white flint (millepora) found in Sweden. 4. Wood of yellow flint found in Italy, in Turkey near Adrianople, and produced by the waters of Lough-neagh in Ireland. III. Larvæ argillaceæ; where the bodies appear to be changed into clay. These are found either loose and friable, or indurated. Of the former kind is a piece of porcelain clay, met with in a certain collection, with all the marks of the root of a tree upon it. Of the latter kind is the osteocolla; which is said to be roots of the poplar tree changed, and not to consist of any calcareous substance. A sort of fossile ivory, with all the properties of clay, is said likewise to be found in some places. IV. Larvæ insalitæ; where the substances are impregnated with great quantities of salts. Human bodies have been twice found impregnated with vitriol of iron in the mine of Fahlun, in the province of Dalarne in Sweden. One of them was kept for several years in a glass case, but at last began to moulder and fall to pieces. Turf and roots of trees are likewise found in water strongly impregnated with vitriol. They do not flame, but look like a coal in a strong fire; neither do they decay in the air. V. Bodies penetrated by mineral inflammable substances. 1. By pit-coal, such as wood; whence some have imagined coal to have been originally produced from wood. Some of these substances are fully saturated with the coally matter; others not. Among the former Cronstedt reckons jet; among the latter the substance called mumia vegetabilis, which is of a loose texture, resembling amber, and may be used as such. 2. Those penetrated by asphaltum or rock-oil. The only example of these given by our author is a kind of turf in the province of Skone in Sweden. The Egyptian mummies, he observes, cannot have any place among this species, as they are impregnated artificially with asphaltum, in a manner similar to what happens naturally with the wood and coally matter in the last species. 3. Those impregnated with sulphur which has dissolved iron, or with pyrites. Human bodies, bivalve and univalve shells, and insects, have been all found in this state; and the last are found in the alum state at Andrarum, in the province of Skone in Sweden. VI. Larvæ metalliferæ; where the bodies are impregnated with metals. These are, 1. Covered with native silver; which is found on the surface of shells in England. 2. Where the metal is mineralised with copper and sulphur. Of this kind is the Fahletz, or gray silver ore, in the shape of ears of corn, and supposed to be vegetables, found in argillaceous slate at Frankenberg and Tahlitteren in Hesse. 3. Larvæ cupriferæ, where the bodies are impregnated with copper. To this species principally belong the turquoise or Turkey stones, improperly so called; being ivory and bones of the elephant or other animals impregnated with copper. See TURQUOISE. At Simore, in the ci-devant Languedoc, there are bones of animals dug up, which, during calcination, assume a blue color; but, according to Cronstedt, it is not probable that these owe their color to copper. 3. With mineralised copper. Of these our author gives two examples. One is where the copper is mineralised with sulphur and iron, forming a yellow marcasitical ore. With this some shells are impregnated which lie upon a bed of loadstone in Norway

Other petrifactions of this kind are found in the form of fish in different parts of Germany. The other kind is where the copper is impregnated with sulphur and silver. Of this kind is the gray silver ore, like ears of corn, found in the slate quarries at Hesse. 4. Larvæ ferriferæ, with iron in form of a calx, which has assumed the place or shape of extraneous bodies. These are either loose or indurated. Of the loose kind are some roots of trees found at the lake Algelma in Finland. The indurated kinds are exemplified in some wood found at Orbissan in Bohemia. 5. Where the iron is mineralised, as in the pyritaceous larvæ. VII. Where the bodies are tending to decomposition, or in a way of destruction. Among these, our author enumerates mould and turf.

There has been lately published at Leipzic, a work in folio, with numerous plates, entitled Geognostical Flora of a former world, by Graf Kasper von Sternberg. The drawings appear to be faithfully executed, and many of the objects represented are of the same description with those so abundantly distributed in our coal-fields. The well-known geologist baron Von Schlotheim has also completed an extensive work on petrifactions, and, judging from the accuracy and extensive knowledge of the author, it cannot fail to prove a valuable addition to this interesting branch of natural history. Emmerling, the mineralogist, has also announced a work on the fossil organic remains met with in brown coal, and other new formations of the same description. A part of this is published.

PETRIFYING WATERS. The river of Ayr, in Ayrshire, has been long said to possess a strong petrifying power; and the water of Ayr stones, which are nothing but wood petrified in that river, are universally known, as substances for making hones for razors. There are also several springs of this kind in Roxburgh-shire. 'One is found,' says the Rev. J. Arkle, 'on the Tweeden, exceedingly powerful, and containing a great quantity of water, where large masses of petrified matter appear on every side converted into solid stone. The progress of the petrifaction is distinct and beautiful. The fog, which grows on the edge of the spring, and is sprinkled with water, is about eight inches high; the lower part is converted into solid stone; the middle appears as if half frozen, and the top is green and flourishing. The petrified matter, when burnt, is resolved into very fine lime. The spring itself, when led over the fields in little rills, fertilises them exceedingly.'—*Sir. J. Sinclair's Statistical Accounts,* Vol. XVI.

PETRINAL, PETRONEL, or POITRINAL, a species of fire-arm between the arquebuse and the pistol, which was used among the French during the reign of Francis I. There is mention made of it in an account of the siege of Rouën, which was undertaken by Henry IV. in 1592. It was shorter than the musket, but of a heavier calibre, and not unlike our blunderbuss; being slung in a cross-belt so as to rest upon the chest of the person who discharged it. From this circumstance it obtained the name of Poitrinal.

PETROBRUSSIANS, a religious sect, which had its rise in France and the Netherlands about A. D. 1110. The name is derived from Peter Bruys, a Provençal, who attempted to reform the abuses of the church. His followers were numerous: and for twenty years he labored in the ministry with great zeal. He was, however, burnt in 1130, by an enraged populace set on by the clergy. The chief of Bruys's followers was a monk named Henry; from whom the Petrobrussians were also called Henricians. They held, 1. That children before the age of reason cannot be justified by baptism. 2. That no churches should be built, but that those that already are should be pulled down. 3. That the cross ought to be pulled down and burnt, because we ought to abhor the instrument of our Saviour's passion. 4. That the real body and blood of Christ are not exhibited in the eucharist, but merely represented by their figures and symbols. 5. That sacrifices, alms, prayers, &c. do not avail the dead.

PETROCORII, the ancient inhabitants of that part of Gaul which was called Perigord before the revolution. Cæs. de Bell. Gall. vii. c. 75.

PETROJOANNITES, followers of Peter John, or Peter Joannes, i. e. Peter the son of John, who flourished in the twelfth century. His doctrine was not known till after his death, when his body was taken out of his grave and burnt. His chief opinions were, that he alone had the knowledge of the true sense wherein the apostles preached the gospel; that the reasonable soul is not the form of man, and that there is no grace infused by baptism.

PETROL, or PETRO'LEUM, *n. s.* } Fr. *petrole.* Liquid; bitumen.

Petrol or *petroleum* is a liquid bitumen, black, floating on the water of springs. *Woodward.*

PETROLEUM, or rock oil, a thick oily substance exuding out of the earth, and collected on the surface of wells in many parts of the world. See CHEMISTRY, Index. It is found in various wells of Italy, in many parts of the late Modenese, France, Switzerland, Germany, and Scotland, as well as in Asia. It is also found mixed with earth and sand, whence it may be separated by infusion in water. It is of a pungent and acrid taste, and smells like the oil of amber, but more agreeable. It is very light and pellucid; but, though equally bright and clear under all circumstances, it is liable to a very great variety in its color. Naturally it is almost colorless, and greatly resembles the purest oil of turpentine; this is called white petroleum, though it is as colorless as water. It is sometimes tinged of brownish, reddish, yellowish, or faint greenish color; but its most frequent color is a mixture of reddish and blackish, in such a degree that it looks black when viewed behind the light, but purple when placed between the eye and the light. It is rendered thinner by distillation with water, and leaves a resinous residuum; when distilled with a volatile alkali, the latter acquires the properties of succinated ammoniac, and contains the acid of amber. It is the most frequent of all the liquid bitumens, and is perhaps the most valuable of them all in medicine. It is to be chosen the purest, lightest, and most pellucid that can be had; of the most penetrating smell and most inflammable. Mon-

net says that some kinds of it are of the density of nut oil. It is insoluble in spirit of wine; which, though it be the great dissolvent of sulphur, has no effect upon petroleum, not even with ever so long a digestion. It will not take fire with the dephlegmatic acid spirits; and in distillation, either by balneum mariæ or in sand, it will neither yield phlegm nor acid spirit; but the oil itself rises in its own form, leaving in the retort only a little matter, thick as honey, and of a brownish color. The finer kinds resemble naphtha. Mr. Bouldoc made several experiments with the white petroleum of Modena; an account of which he gave to the Paris academy. It easily took fire on being brought near a candle, and that without immediately touching the flame; and when heated in any vessel it will attract the flame of a candle, though placed at a great height above the vessel; and, the vapor it sends up taking fire, the flame will be communicated to the vessel of heated liquor, and the whole will be consumed. Alonso Barba gives a melancholy instance of the power of petroleum of taking fire at a distance. A certain well yielding petroleum on the surface of its water being to be repaired, the workman took down into the well with him a lantern and a candle in it; there were some holes in the lantern, through which the petroleum at a considerable distance sucked out the flame of the candle, and, taking fire, burst up with the noise of a cannon, and tore the man to pieces. It burns in the water; and when mixed with any liquor swims on the surface of it, even of the highest rectified spirit of wine, which is one-seventh heavier than pure petroleum. It readily mixes with all the essential oils of vegetables, as oil of lavender, turpentine, &c., and seems very much of their nature. The distinguishing characteristic of the petroleum is its thickness, resembling inspissated oil; when pure it is lighter than spirit of wine; but, though ever so well rectified, it becomes in time thick and black as before. Petroleum, when shaken, yields a few bubbles; but they sooner subside than in almost any other liquor, and the liquor resumes its clear state again almost immediately. This seems owing to the air in this fluid being very equally distributed to all its parts, and the liquor being composed of particles very evenly and nicely arranged. The extensibility of the oil is also amazing. A drop of it will spread over several feet of water, and in this condition it gives a great variety of colors; that is, the several parts of which this thin film is composed act as so many prisms. The most severe frost never congeals petroleum into ice; and paper wetted with it becomes transparent as when wetted with oil; but it does not continue so, the paper becoming opaque again in a few minutes as the oil dries away. There are three varieties according to Mongez: 1. The yellow, found at Modena in Italy; very light and volatile. 2. The reddish, or yellowish red; some of which is collected at Gabian in Languedoc and in Alsace. 3. The heavy black or brown kind, which is the most common, and met with in England, France, Germany, and some other countries. It generally runs out either from chinks or gaps of rocks, or is mixed with the earth, and gushes out of it; or swims on the water of some fountains. According to Dr. Lippert, a kind of resin is produced by mixing petroleum with smoking nitrous acid. The taste of this substance is very bitter, but the smell resembles that of musk. The vitriolic acid, according to Lippert, produces a resin still more bitter, but without any aromatic smell. Cronstedt enumerates the following species:—

I. Petroleum Barbadense, Malcha or Barbadoes tar, a thick substance resembling soft pitch. It is found in several parts of Europe and Asia; particularly Sweden, Germany, and Switzerland; on the coast of the Dead Sea in Palestine; in Persia, in the chinks of rocks, and in strata of gypsum and limestone, or floating upon water. It is found also in America, and at Colebrook-dale in England. It melts easily and burns with much smoke and soot, leaving either ashes or a slag according to the heterogeneous matter it contains. It contains a portion of the acid of amber. It gives a bitter salt with mineral alkali, more difficult of solution than common salt, and which, when treated with charcoal, does not yield any sulphur.

II. Petroleum Elasticum, elastic bitumen, or mineral caoutchouc.

III. Petroleum Induratum, hardened rock-oil, or fossile pitch, an inflammable substance dug out of the ground in many parts of the world, and known by the names of petroleum induratum, pix montana, indenpech, berghartz, &c. There are two species: 1. The asphaltum or pure fossile pitch, found on the shores of the Dead Sea, and of the Red Sea; also in Sweden, Germany, and France. See Asphaltum. It is likewise found in great quantities in a bituminous lake in the isle of Trinidad. See Trinidad. It is a smooth, hard, brittle, inodorous substance, of a black or brown color when looked at; but, on holding it up betwixt the eye and the light, appears of a deep red. It swims in water; breaks with a smooth and shining surface; melts easily, and when pure burns without leaving any ashes; but if impure, leaves ashes, or a slag. M. Monnet asserts that it contains sulphur, or at least the vitriolic acid. It is slightly and partially acted upon by spirits of wine and ether. Brunnich says, the asphaltum comes from Porto Principe in the island of Cuba in the West Indies. It is likewise found, according to Fourcroy, in many parts of China; and is used for a covering to ships by Arabs and Indians. 2. The pix montana impura contains a great quantity of earthy matter, which is left in the retort after distillation, or upon the charcoal if burnt in the open fire. It coheres like a slag, and is of the color of black lead; but, in a strong heat, this earth is soon volatilised, so that its nature is not yet well known. During the distillation a liquid substance falls into the receiver, which is found to be of the same nature with rock-oil. The substance itself is found in Sweden and several other countries. The pissasphaltum is of a mean consistence, between the asphaltum and the common petroleum. Mongez says that it is the same with the bitumen collected from a well named De la Pege, near Clermont Ferrand in France. The people

of Mount Ciaro, in Italy, several years ago, discovered an easier way of finding petroleum than that to which they formerly had been used. This mountain abounds with a sort of grayish salt, which lies in large horizontal beds, mingled with strata of clay, and large quantities of a spar of that kind called by the Germans selenites; which is the common sort, that ferments with acids, and readily dissolves in them, and calcines in a small fire. They pierce these slates in a perpendicular direction till they find water; and the petroleum which had been dispersed among the cracks of those slates is then washed out by the water, and brought from all the neighbouring places to the hole or well which they have dug, on the surface of the water of which it swims after eight or ten days. When there is enough of it got together, they lade it from the top of the water with brass basins; and it is then easily separated from what little water is taken up with it. These wells or holes continue to furnish the oil in different quantities for a considerable time; and, when they will yield no more, they pierce the slates in some other place. It is never used among us as a medicine; but the French give it internally in hysteric complaints, and to their children for worms; some also give it from ten to fifteen drops in wine for suppressions of the menses. This, however, is rather the practice of the common people than of the faculty.

PETROMYZON, the lamprey, in ichthyology, a genus of fishes belonging to the class of amphibia nantes. It has seven spiracula at the side of the neck, no gills, a fistula on the top of the head, and no breast or belly fins. There are three species, distinguished by peculiarities in their back fins.

1. P. bronchialis, or lampern, is sometimes found of the length of eight inches, and about the thickness of a swan's quill; but they are generally much smaller. The body is marked with numbers of transverse lines, that pass cross the sides from the back to the bottom of the belly, which is divided from the mouth to the anus by a straight line. The back fin is not angular, but of an equal breadth. The tail is lanceolated, and short at the end. They are frequent in the rivers near Oxford, particularly the Isis; but not peculiar to that county, being found in other English rivers, where, instead of concealing themselves under the stones, they lodge in the mud, and are never observed to adhere to any thing like other lampreys.

2. P. fluviatilis, the river or lesser lamprey, sometimes grows to the length of ten inches. The mouth is formed like that of the preceding. On the upper part is a large bifurcated tooth: on each side are three rows of very minute ones: on the lower part are seven teeth, the exterior of which on one side is the largest. The irides are yellow. As in all the other species, between the eyes on the top of the head is a small orifice, of great use to clear its mouth of the water that remains on adhering to the stones; for through that orifice it ejects the water in the same manner as cetaceous fish. On the lower part of the back is a narrow fin; beneath that rises another, which at the beginning is high and angular, then grows narrow, surrounds the tail, and ends near the anus. The color of the back is brown or dusky, sometimes mixed with blue; the whole underside silvery. These are found in the Thames, Severn, and Dee; are potted with the larger kind; and are by some preferred to it, as being milder tasted. Vast quantities are taken about Mortlake, and sold to the Dutch for bait for their cod fishery. Above 430,000 have been sold in a season at 40s. per 1000; and, of late, about 100,000 have been sent to Harwich for the same purpose. It is said that the Dutch have the secret of preserving them till the turbot fisher..

3. P. marinus, the sea lamprey, is sometimes found so large as to weigh four or five pounds. It greatly resembles the eel in shape; but its body is larger, and its snout longer, narrower, and sharper, at the termination. The opening of the throat is very wide; each jaw is furnished with a single row of very small teeth; in the middle of the palate are situated one or two other teeth, which are longer, stronger, and moveable towards the inside of the throat; the inferior part of the palate presents moreover a row of very small teeth, which reaches to the bottom of the throat, where are four long notched bones; two short fistulous processes are observable at the extremity of the snout, and there are two others thicker, but still shorter, above the eyes. Willoughby supposes that the latter are the organ of hearing, and the former the organ of smell. His opinion with regard to the auditory faculty of this fish is founded on what we read in ancient authors, that the fishermen attracted the lampreys by whistling, and that Crassus had tamed one of them to such a degree that it knew his voice and obeyed his call. The eyes of the lamprey are small, and covered with a transparent light blue membrane; the pupil is bordered with a circle of a color resembling gold; near the gills, which are four, there is a round hole on both sides, through which it discharges the water. The lamprey has no fins on his belly or breast; on the back we observe a fin, which begins pretty near the head, extends to the tail which it turns round, and is afterwards continued to the anus; this fin is covered by the skin of the body, to which it adheres but loosely; the skin is smooth, of a red blackish color, and streaked with yellow, the lamprey advances in the water with winding motions, like those of a serpent, which is common to it, with all the anguilliform fishes. The lamprey lives on fish. During the cold it lies concealed in the crevices of sea rocks, and consequently is fished for only at certain seasons.. It lives in a state of hostility with the poulpe, a kind of sea polypus, which shuns the combat as long as it can; but, when it finds the impossibility of escape, it endeavours to surround the lamprey with its long arms. The latter slips away, and the poulpe becomes its prey. The lobster, we are told, avenges the poulpe, and destroys the lamprey in its turn. See CANCER. Rondelet says that the fishermen consider the bite of the lamprey as venomous and dangerous, and never touch it while alive but with pincers. They beat it on the jaws with a stick, and cut off its

head. He adds, that its ashes are a cure for its bite, and for the king's evil. When any one has been bitten by a lamprey, the most effectual method is to cut out the part affected. Lampreys are very dexterous in saving themselves; when taken with a hook, they cut the line with their teeth; and, when they perceive themselves caught in a net, they attempt to pass through the meshes. They fish for lampreys only on the pebbly edges of sea rocks; some of these pebbles are drawn together to make a pit as far as the water's edge, or a little blood is thrown in, and the lamprey immediately puts forth its head between two rocks. As soon as the hook, which is baited with a crab or some other fish, is presented to it, it swallows greedily, and drags it into its hole. There is then occasion for great dexterity to pull it out suddenly; for if it is allowed time to attach itself by the tail, the jaw would be torn away before the fish could be taken. This shows that its strength resides in the end of its tail; for the great bone of this fish is reversed, so that the bones, which in all other fishes are bent towards the tail, are here turned in a contrary direction, and ascend towards the head. After the lamprey is taken out of the water, it is not killed without a great deal of trouble; the best way is to cut the end of its tail, or to crush it with repeated blows on the spine, to prevent it from leaping: as its animal life extends to the end of the spinal marrow. M. De Querhoent denies the supposed poison of the lamprey. This species, he says, abounds on the coasts of Africa, at the Antilles, on the coast of Brasil, at Surinam, and in the East Indies. When taken with a hook, the fisher must kill it before he takes it off, otherwise it darts upon him, and wounds him severely. Its wounds, however, are not venomous, M. de Querhoent having seen several sailors who were bitten by it, but experienced no disagreeable consequences. Lampreys are likewise found in great abundance at Ascension Island, but particularly in the seas of Italy: their flesh when dried is excellent; and boiling gives to the vertebræ the color of gridelin. The flesh of the lamprey is white, fat, soft, and tender; it is pretty agreeable to the taste, and almost as nourishing as that of the eel; those of a large size are greatly superior to the small ones. Mr. Pennant is of opinion that the ancients were unacquainted with this fish.

PETRONEL, *n. s.* Fr. *petrinal.* A pistol; a small gun used by a horseman.

> And he with *petronel* upheaved,
> Instead of shield the blow received,
> The gun recoiled as well it might.
> *Hudibras.*

PETRONEL. See PISTOL, AND PETRINEL.

PETRONIUS, a renowned Roman senator. When governor of Egypt, he permitted Herod, king of the Jews, to purchase in Alexandria a large quantity of corn for the supply of his subjects, who were afflicted with a severe famine. When Tiberius died, Caius Caligula, who succeeded him, took from Vitellius the government of Syria, and gave it to Petronius, who discharged the duties of his office with dignity and honor. From his favoring the Jews, he ran the risk of losing the emperor's friendship and his own life; for when that prince gave orders to have his statue deposited in the temple of Jerusalem, Petronius, finding that the Jews would rather suffer death than see that sacred place profaned, was unwilling to have recourse to violent measures; and therefore preferred moderation to cruel measures to enforce obedience. In his voyage to Africa, of which country he had been appointed quæstor, the ship in which he sailed was taken by Scipio, who caused all the soldiers to be put to the sword, and promised to save the quæstor's life, provided he would renounce Cæsar's party. Petronius replied that 'Cæsar's officers were accustomed to grant life to others, and not to receive it;' and, at the same time, he stabbed himself with his own sword.

PETRONIUS ARBITER (Titus), a great critic and polite writer, the favorite of Nero, supposed to be the same mentioned by Tacitus in his Annals, lib. xvi. He was proconsul of Bithynia, and afterwards consul, and appeared capable of the greatest employments. He was one of Nero's principal confidants, and the superintendant of his pleasures. The great favor shown him drew upon him the envy of Tigellinus, another of Nero's favorites, who accused him of being concerned in a conspiracy against the emperor: on which Petronius was seized, and was sentenced to die. He met death with a striking indifference, and seems to have tasted it nearly as he had done his pleasures. He would sometimes open a vein, and sometimes close it, conversing with his friends in the meanwhile, not on the immortality of the soul, which was no part of his creed, but on topics which pleased his fancy, as of love-verses, agreeable and passionate airs. Of this disciple of Epicurus, Tacitus gives the following character:—'He was,' says he, 'neither a spendthrift nor a debauchee; but a refined voluptuary, who devoted the day to sleep, and the night to the duties of his office, and to pleasure.' He is much distinguished by a satire which he wrote, and secretly conveyed to Nero; in which he ingeniously describes, under borrowed names, the character of this prince. Peter Petit discovered at Traw in Dalmatia, in 1665, a considerable fragment containing the sequel of Petronius's Trimalcion's Feast. This fragment, which was printed in 1666 at Padua and Paris, produced a paper war among the learned. While some affirmed that it was the work of Petronius, and others denied it to be so, Petit sent it to Rome. The French critics, who had attacked its authenticity, were silent after it was deposited in the royal library. It is now generally attributed to Petronius. The public did not form the same favorable opinion of some other fragments, which were extracted from a MS. found at Belgrade in 1688, and printed at Paris by Nodot in 1694, though they are ascribed by the editor Charpentier, and other learned men, to Petronius. His genuine works are, 1. A Poem on the Civil War between Cæsar and Pompey, translated into prose by Marolles, and into French verse by Bouhier, 1737, in 4to. Petronius, disgusted with Lucan's flowery language, opposed a Pharsalia to his Pharsalia; but his

work, though superior to Lucan's in some respects, is not in the true style of epic poetry. 2. A Poem on the Education of the Roman Youth. 3. Two Treatises upon the corruption of Eloquence, and the Decay of Arts and Sciences, 4. A Poem on Dreams. 5. The Shipwreck of Licas. 6. On the Inconstancy of Human Life. And, 7. Trimalcion's Banquet. This last performance is a description of the pleasures of a corrupted court; and the painter is rather an ingenious courtier than a person whose aim is to reform abuses. The best editions of Petronius are those published at Venice, 1499, in 4to.; at Amsterdam, 1669, in 8vo.; cum notis Var. Ibid. with Boschius's notes, 1677, in 24to.; and 1700, 2 vols. in 24mo. The edition variorum was reprinted in 1743, in 2 vols. 4mo., with Peter Burman's commentaries. Petronius died in 65 or 66.

PETRONIUS GRANIUS, a centurion in the eighth legion, who served with reputation under Cæsar in the Gallic war.

PETRONIUS MAXIMUS was born A.D. 395, of an illustrious family, being at first a senator and consul of Rome. He put on the imperial purple in 455, after having effected the assassination of Valentinian III. To establish himself upon the throne, he married Eudoxia, the widow of that prince; and, as she was ignorant of his villany, he confessed to her, in a transport of love, that the strong desire he had of being her husband had made him commit this atrocious crime. Whereupon Eudoxia privately applied to Genseric, king of the Vandals, who, coming into Italy with a very powerful army, entered Rome, where the usurper then was. Petronius endeavoured to escape; but the soldiers and people, enraged at his cowardice, fell upon him, and overwhelmed him with a shower of stones. His body was dragged through the streets for three days; and, after every other mark of disgrace, thrown into the Tiber, the 12th of June, 455. He reigned only seventy-seven days. Yet he had some good qualities. He loved and cultivated the sciences. He was prudent in council, circumspect in his actions, equitable in his judgments, a facetious companion, and steady friend. He had gained the affections of every body, while he remained in a private station.

PETROSA OSSA, in anatomy, a name given to the fourth and fifth bones of the cranium, called also ossa temporum and ossa squamosa; the substance whereof, as their first and last names express, is squamose and very hard.

PETROSELINUM (apium petroselinum, Lin.), parsley. See APIUM. This plant is commonly cultivated for culinary purposes. The seeds have an aromatic flavor, and are occasionally used as carminatives, &c. The root is one of the five aperient roots, and with this intention is sometimes made an ingredient in apozems and diet-drinks; if liberally used, it is apt to occasion flatulencies; and thus, by distending the viscera, produces a contrary effect to that intended by it; the taste of this root is somewhat sweetish, with a light degree of warmth and aromatic flavor.

PETROSILEX, in mineralogy, compact felsspar. See MINERALOGY.

PETSCHORA, a large river of European Russia, *which rises in the Ural Mountains, flows to the northward through the governments of Perm and Archangel, and falls into the Arctic* Ocean, near Pustoserskoe, after a course of above 600 miles. It receives the Lialsa, Ukscha, and Elima, and is navigable during summer. The steppes of Petschora form an immense plain, lying between the Dwina and Petschora, in which there is a number of lakes. The north part of the steppes is covered with nothing but moss and stunted shrubs; but in the south there are large forests. The surface on the east side is rocky. The inhabitants are wandering Samojedes.

PETTEIA, in the ancient music, a term to which we have no one corresponding in our language. The melopœia, or the art of arranging sounds in succession so as to make melody, is divided into three parts, which the Greeks call lepsis, mixis, and chresis; the Latins sumptio, mixtio, and usus; and the Italians presa, mescolamento, and uso. The last of these is called by the Greeks πεττεια, and by the Italians pettia; which therefore means the art of making a just discernment of all the manners of ranging or combining sounds among themselves, so that they may produce their effect, i. e. may express the several passions intended to be raised. Thus it shows what sounds are to be used, and what not; how often they are severally to be repeated; with which to begin, and with which to end; whether with a grave sound to rise, or an acute one to fall, &c. The petteia constitutes the manner of the music; chooses out this or that passion, this or that motion of the soul, to be awakened; and determines whether it be proper to excite it on this or that occasion. The petteia, therefore, is in music much what the manners are in poetry. It is not easy to discover whence the denomination should have been taken by the Greeks, unless from πεττεια, their game of chess; the musical petteia being a sort of combination and arrangement of sounds, as chess is of pieces called πεττοι calculi, or chess-men.

PET'TICOAT, *n. s.* Fr. *petit* and *coat.* The lower part of a woman's dress.

What trade art thou, Feeble?—A woman's taylor, Sir.—Wilt thou make as many holes in an enemy's battle, as thou hast done in a woman's *petticoat*? *Shakspeare.*

Her feet beneath her *petticoat*,
Like little mice, stole in and out,
As if they fear'd the light. *Suckling.*

It is a great compliment to the sex, that the virtues are generally shewn in *petticoats.* *Addison.*

To fifty chosen sylphs, of special note,
We trust the important charge, the *petticoat*;
Oft have we known that sevenfold fence to fail,
Though stiff with hoops, and armed with ribs of
whale. *Pope.*

As we were in the midst of the service a lady who is the chief woman of the place, and had passed the winter at London with her husband, entered the congregation in a little head-dress, and a hooped *petticoat.* *Spectator.*

PET'TIFOGGER, *n. s.* From Fr. *pettivoguer*; *petit* and *voguer.* A petty lawyer; a 'trouble-town,' says Minsheu, 'having neither law nor conscience.'

The worst conditioned and least cliented *petifoguers* get, under the sweet bait of revenge, more plentiful prosecution of actions.
Carew's Survey of Cornwall.

Your *pettifoggers* damn their souls
To share with knaves in cheating fools.
Hudibras.

Consider, my dear, how indecent it is to abandon your shop and follow *pettifoggers*: there is hardly a plea between two country esquires about a barren acre, but you draw yourself in as bail, surety, or solicitor. *Arbuthnot's John Bull.*

Physicians are apt to despise empyrics; lawyers, *pettifoggers*; and merchants, pedlars. *Swift.*

PETTITOES, *n. s.* Petty and toe. The feet of a sucking pig: human feet, in contempt.

My good clown grew so in love with the wenches' song, that he would not stir his *pettitoes*, till he had both tune and words. *Shakspeare. Winter's Tale.*

PETTO, *n. s.* Ital. and Belg. The breast; figuratively, privacy. Thus we say, 'en petto.'

PETTY, *adj.* } Fr. *petit.* Small; in-
PET'TINESS, *n. s.* } ferior; inconsiderable; paltry: pettiness is littleness of matter or character; meanness.

The losses we have borne, the subjects we
Have lost, and the disgrace we have digested;
To answer which his *pettiness* would bow under.
Shakspeare.

When he had no power,
But was a *petty* servant to the state,
He was your enemy. *Id. Coriolanus.*

It is a common experience, that dogs know the dog-killer; when, as in time of infection, some *petty* fellow is sent out to kill the dogs. *Bacon.*

It importeth not much, some *petty* alteration or difference it may make. *Id.*

From thence a thousand lesser poets sprung,
Like *petty* princes from the fall of Rome. *Denham.*

Will God incense his ire
For such a *petty* trespass? *Id.*

Common reason directed even Pagan wise men wholly to interdict swearing in ordinary conversation, or about *petty* matters, as an irrational and immoral practice, unworthy of sober and discreet persons. *Barrow.*

They believe one only chief and great God, which hath been from all eternity; who, when he proposed to make the world, made first other gods of a principal order; and after, the sun, moon, and stars, as *petty* gods. *Stillingfleet.*

Bolonia watered by the *petty* Rhine.
Addison.

By all I have read of *petty* commonwealths, as well as the great ones, it seems to me that a free people do of themselves divide into three powers.
Swift.

Can an example be given, in the whole course of this war, where we have treated the *pettiest* prince, with whom we have had to deal, in so contemptuous a manner? *Id.*

PETTY (Sir William), son of Anthony Petty, a clothier, was born at Romsey, a small market town in Hampshire, in 1623. It is difficult to determine, whether the course of his education was directed more by his father or himself; for being taken when a child to view the common mechanics at work, he soon, by the bent of genius and inclination, took up the tools, and learned to handle them with such dexterity, that at twelve he had attained a skill in various trades, not much inferior to that of the ordinary workman. At fifteen he was master of the Latin, Greek, and French tongues, and of arithmetic and those parts of geometry and astronomy useful to navigation. Soon after he went to Caen and Paris, where he studied anatomy with Mr. Hobbes. Upon his return to England, he was preferred in the king's navy. In 1643, when the war occurred between the king and parliament, he went into the Netherlands and France for three years; and having prosecuted his studies in physic at Utrecht, Leyden, Amsterdam, and Paris, he retured home to Rumsey. In 1647 he obtained a patent to teach the art of double writing for seventeen years. In 1648 he published at London, Advice to Mr. Samuel Hartlib, for the advancement of some particular parts of learning. At this time he adhered to the prevailing party of the kingdom: and went to Oxford, where he taught anatomy and chemistry, and was created M. D. In 1650 he was made professor of anatomy there; and soon after a member of the college of physicians in London, and physician to the army in Ireland; where he continued till 1659, and acquired a great fortune. After the Restoration he was introduced to king Charles II., who knighted him in 1661. In 1662 he published A Treatise of Taxes and Contributions. In 1663 he invented a double-bottomed ship. He died at London of a gangrene in the foot, occasioned by a swelling of the gout, in 1687. The character of his genius is sufficiently seen in his writings, which are very numerous. Amongst these he wrote the History of his own Life. He died possessed of a fortune of about £15,000 a-year.

PETTY (William), marquis of Lansdown, was descended from the above Sir William Petty, and born in 1737. He succeeded to the Irish title of earl of Shelburne, on the death of his father in 1761; and in 1763 was president of the board of trade, an office which he resigned to join the train of opposition led by Mr. Pitt (lord Chatham), with whom he returned to office in 1766. When a change of ministry took place, in 1768, he became an antagonist of ministers till 1782, when he was nominated secretary of state for the foreign department. On the death of the marquis of Rockingham he was succeeded by lord Shelburne; but he was soon obliged to give way to the coalition between lord North and Mr. Fox. In 1784 his lordship became an English peer, by the titles of marquis of Lansdown and earl of Wycombe; and employed himself in the cultivation of science and literature at Bow Wood, his seat in Wiltshire. He collected a valuable library, the MSS. belonging to which were, after his death, purchased by the British Museum. His death took place in 1805.

PETTY BAG, an office in chancery, the three clerks of which record the return of all inquisitions out of every county, and make all patents of comptrollers, gaugers, customers, &c.

PETTY LARCENY. See LARCENY.

PETTY SINGLES, among falconers, the toes of a hawk.

PETTY TALLY, in the sea language, a competent allowance of victuals, according to the number of the ship's company.

PETTY TREASON. See TREASON.

PETTY WHIN, a species of ononis.

PET'ULANCE, *n. s.* } Fr. *petulance;* Lat. *petulantia.* Peevishness; pertness; wantonness: petulant and petulantly follow these senses.
PET'ULANCY,
PET'ULANT, *adj.*
PET'ULANTLY, *adv.*

It was excellently said of that philosopher that there was a wall or parapet of teeth set in our mouth, to restrain the *petulancy* of our words. *Ben Jonson.*

Such was others *petulancy*, that they joyed to see their betters shamefully outraged and abused. *King Charles.*

Wise men knew, that which looked like pride in some, and like *petulance* in others, would, by experience in affairs and conversation amongst men, be in time wrought off. *Clarendon.*

The tongue of a man is so *petulant*, and his thoughts so variable, that one should not lay too great stress upon any present speeches and opinions. *Spectator.*

However their numbers, as well as their insolence and perverseness increased, many instances of *petulancy* and scurrility are to be seen in their pamphlets. *Swift.*

There appears in our age a pride and *petulancy* in youth, zealous to cast off the sentiments of their fathers and teachers. *Watts.*

If the opponent sees victory to incline to his side, let him shew the force of his argument, without too importunate and *petulant* demands of an answer. *Id.*

To be humane, generous and candid, is a very high degree of merit in any case; but those qualifications deserve still greater praise, when they are found in that condition which makes almost every other man, for whatever reason, contemptuous, insolent, *petulant*, selfish, and brutal. *Johnson.*

PETUNSE, in natural history, one of the substances whereof porcelain or china-ware is made. The petunse is a coarse kind of flint or pebble, the surface of which is not so smooth when broken as that of our common flint. See PORCELAIN. According to Chaptal, the petunse is that species of silex known by the names of feldspar, rhomboidal quartz, and spathum scintillans. It very frequently forms one of the principles of granite, and the crystals which are found separate arise from the decomposition of this primitive rock. The texture of feldspar is close, lamellated, and it is less hard than quartz. It fuses, without addition, into a whitish glass. The specific gravity of white feldspar is 25·946: 100 parts of white feldspar contain about 67 silex, 14 alumine, 11 barytes, and 8 magnesia.

PETWORTH, a market-town and parish in Sussex, near the river Arun, twelve miles from Arundel, and fifty south-west from London. In this place is the magnificent seat of the earl of Egremont. The streets of the town are irregular, but the houses are well built. In the centre is a market-house, in one of the rooms over which the quarter sessions are held. Here are also a charity-school, alms-house, hospital, and a bridewell, on Howard's plan. The church is a neat building, and has several monuments of the Percy family. Market on Saturday. Fairs, Holy-Thursday, and November 20th.

PEUCEDANUM, or sulphur-wort, a genus of the digynia order, belonging to the pentandria class of plants; and in the natural method ranking under the forty-fifth order, umbellatæ. The fruit is lobated, striated on both sides, and surrounded by a membrane; the involucra are very short. There are three species, none of which have any remarkable properties, excepting the P. officinale, or common hog's fennel, growing naturally in the English salt marshes, and rising to the height of two feet, with channelled stalks, which divide into two or three branches, each crowned with an umbel of yellow flowers, composed of several small circular umbels. The roots, when bruised, have a strong fœtid scent like sulphur, and an acrid, bitterish, unctuous taste. Wounded in the spring, they yield a considerable quantity of yellow juice, which dries into a gummy resin, and retains the strong smell of the root. The expressed juice was used by the ancients in lethargic disorders.

PEUCER (Gaspar), professor of medicine at Wirtemberg, was born at Bautzen in Lusatia. He married a daughter of Melancthon, whose works he published in 1601, in 5 vols. Being a Protestant, and being closely imprisoned for ten years for his opinions, he wrote his thoughts on the margins of old books, with ink made of burnt crusts soaked in wine. He died in 1602.

PEUCESTES, a brave general under Alexander the Great, who bestowed on him a crown of gold. See MACEDON.

PEVENSEY, a town of Sussex, on a river which runs into a bay in the English Channel, and forms Pevensey Harbour. It has an ancient castle, originally belonging to Robert earl of Moreton, brother to William the Conqueror, and thought a fine specimen of Roman architecture. Sueno the Dane landed at it in 1049, carried off his cousin Beorn, and murdered him. It was afterwards ravaged by earl Godwin and his son Harold, who carried off many ships. The church is also an ancient structure. The castle belongs at present to the Cavendish family. Here William the Conqueror landed previous to the battle of Hastings. It is fourteen miles W. S. W. of Hastings, and sixty-three south of London.

PEUTEMAN (Peter), a Dutch painter, born at Rotterdam in 1650. His subjects were either allegorical or emblematical allusions to the shortness and misery of human life. He died in consequence of a fright in 1692.

PEUTINGER (Conrad), a learned German, born at Augsburg in 1465. He became secretary to the senate of Augsburg; and published an ancient itinerary, called Tabula Peutingerina, marking the roads by which the Roman armies passed to the greater part of the empire. He died in 1574.

PEW, *n. s.* Belg. *puy;* Ital. *poggio.* A seat enclosed in a church.

When Sir Thomas More was lord chancellor, he did use at mass, to sit in the chancel, and his lady in a *pew.* *Bacon.*

How I foresee in many ages past,
When Lolioe's caytive name is quite defaced,
Thine heyre, thine heyre's heyre, and his heire again,
From out the loynes of careful Lolian,
Shall climbe up to the chancell *pewes* on hie,
And rule and raigne in their rich tenancie.
Hall's Satires.

Should our sex take it into their heads to wear trunk breeches at church, a man and his wife would fill a whole *pew*. *Addison.*

She decently, in form, pays heaven its due;
And makes a civil visit to her *pew*. *Young.*

PEWS, in a church, are somewhat in the nature of an heir-loom; and may descend by immemorial custom, without any ecclesiastical concurrence, from the ancestor to the heir. The right to sit in a particular pew in the church arises either from prescription as appurtenant to a messuage; or from a faculty or grant from the ordinary; for he has the disposition of all pews which are not claimed by prescription. Gibs. Cod. 221. In an action for a disturbance of the enjoyment of a pew, if the plaintiff claims it by prescription, he must state it in the declaration as appurtenant to a messuage in the parish; and then such prescription may be supported by an enjoyment for thirty-six years; and perhaps for any time above twenty years. 1 Term. Rep. 428. So uninterrupted possession of a pew in the church for thirty years, unexplained, is presumptive evidence of a prescriptive right to the pew in an action against a wrong-doer: but may be rebutted by proof that prior to that time the pew had no existence. 5 Term. Rep. K. B. 297.

PE'WET, *n. s.* Teut. *piewit;* Belg. *kiewit.* A water fowl.

We reckon the dip-chick, so named of his diving and littleness, puffins, *pewets*, meawes. *Carew.*

PEW'TER, *n. s.* } Fr. *epeutre;* Ital. and PEW'TERER. } Span. *peltre*. An artificial metal, principally made of tin; the pewter vessels of a house: a worker of pewter.

He shall charge you and discharge you with the motion of a *pewterer's* hammer. *Shakspeare.*

Coarse *pewter* is made of fine tin and lead. *Bacon.*

The *pewter*, into which no water could enter, became more white, and liker to silver, and less flexible. *Id.*

Pewter dishes, with water in them, will not melt easily, but without it they will; nay, butter or oil, in themselves inflammable, yet, by their moisture, will hinder melting. *Id.*

We caused a skilful *pewterer* to close the vessel in our presence with soder exquisitely. *Boyle.*

The eye of the mistress was wont to make her *pewter* shine. *Addison.*

Nine parts or more of tin, with one of regulus of antimony compose *pewter*. *Pemberton.*

PEWTER, in French called *étain*, and often confounded thus with pure tin, is a factitious metal used in making domestic utensils, as plates, dishes, &c. The basis is tin, which is converted into pewter by mixing at the rate of 1 cwt. of tin with fifteen pounds of lead and six pounds of brass. Besides this composition, which makes the common pewter, there are other kinds, compounded of tin, antimony, bismuth, and copper, in several proportions.

'Blocks of tin are often melted by the pewterers into small rods. I found that a cubic foot of the specimen I examined,' says Dr. Watson, 'weighed 7246 ounces: but even this sort exceeds in purity any of the kinds examined by some authors. Chemistry affords certain methods of discovering the quantity of lead with which tin is alloyed; but these methods are often troublesome in the application. Pewterers, and other dealers in tin, use not so accurate a method of judging of its purity, but one founded on the same principle; for the specific gravities of bodies being nothing but the weights of equal bulks of them, they cast a bullet of pure tin, and another of the mixture of tin and lead, which they want to examine, in the same mould; and the more the bullet of the mixture exceeds the bullet of pure tin in weight, the more lead they conclude it contains.

'Pewter is a mixed metal; it consists of tin united to small portions of other metallic substances, such as lead, zinc, bismuth, and the metallic part, commonly called regulus of antimony. We have three sorts of pewter in common use; they are distinguished by the names of plate, trifle, ley. The plate pewter is used for plates and dishes; the trifle chiefly for pints and quarts; and the ley-metal for wine measures, &c. Our very best sort of pewter is said to consist of 100 parts of tin and of seventeen of regulus of antimony, though others allow only ten parts of regulus to 100 of tin; to this composition the French add a little copper. Crude antimony, which consists of nearly equal portions of sulphur and of a metallic substance, may be taken inwardly with great safety; but the metallic part, or regulus, when separated from the sulphur, is held to be very poisonous. Yet plate-pewter may be a very innocent metal; the tin may lessen or annihilate the noxious qualities of the metallic part of the antimony. We have an instance somewhat similar to this in standard silver, the use of which has never been esteemed unwholesome notwithstanding it contains nearly one-twelfth of its weight of copper. Though standard silver has always been considered as a safe metal, when used for culinary purposes, yet it is not altogether so; the copper it contains is liable to be corroded by saline substances into verdigris. This is frequently seen, when common salt is suffered to stay a few days in silver saltsellers, which have not a gold gilding; and even saline draughts, made with volatile salt and juice of lemons, have been observed to corrode a silver tea-spoon which had been left a week in the mixture.'

The weight of a cubic foot of each of these sorts of pewter is:

Plate	7248
Trifle	7359
Ley	7963

If the plate-pewter be composed of tin and regulus of antimony there is no reason to expect that a cubic foot of it should be heavier than it appears to be; since regulus of antimony, according to the different ways in which it is made, is heavier or lighter than pure tin. A very fine silver-looking metal is said to be composed of 100 pounds of tin, eight of regulus of antimony, one of bismuth, and four of copper. The ley pewter, if we may judge of its composition by comparing its weight with the weights of the mixtures of tin and lead mentioned in the table, contains not so much as a third, but more than a fifth, part of its weight of lead: this quantity of lead is far too much, considering one of the uses to which this sort of pewter is applied; for acid

wines will readily corrode the lead of the flagons in which they are measured into sugar of lead; this danger is not so great with us, where wine is seldom sold by the measure, as it is in other countries where it is generally sold so; and their wine measures contain, probably, more lead than ours do. Our English pewterers have at all times made a mystery of their art; and their caution was formerly so much encouraged by the legislature that an act of parliament was passed, rendering it unlawful for any master-pewterer to take an apprentice, or to employ a journeyman, who was a foreigner. In the present improved state of chemistry this caution is useless; since any one tolerably skilled in that science would be able to discover the quality and quantity of the metallic substances used in any particular sort of pewter; and it is not only useless now, but one would have thought it must have been always so; whilst tin, the principal ingredient, is found in England in the purest state, as well as largest quantity. See CHEMISTRY

Pewter has occasionally served for money. In the Philosophical Transactions, M. Putland states that king James II. turned all the pewter vessels, &c., of the Protestants in Ireland he could seize, into money; half-crowns were somewhat bigger than halfpence, and other pieces in proportion. He ordered it to be current in all payments: whence, our author observes, people absconded for fear of being paid their debts: he also mentions crown pieces of this metal, with this legend on the rim, 'melioris tessera fati.'

PEYER (J. Conrad), a learned German physician, born at Schaffhausen. He published Exercitatio Anatomica Medica de Glandulis Intestinorum, at Schaffhausen, in 1677.

PEYRERE (Isaac la), was born at Bourdeaux, of Protestant parents. He entered into the service of the prince of Condé, who was much pleased with the singularity of his genius. From the perusal of St. Paul's writings he took into his head to aver that Adam was not the first of the human race; and to prove this extravagant opinion, he published in 1655 a book, printed in Holland in 4to. and in 12mo., with this title, Præadamitæ, sive exercitatio super versibus 12, 13, 14, cap. 15, Epistolæ Pauli ad Romanos. This was burnt at Paris, and the author imprisoned at Brussels. The prince of Condé having obtained his liberty, he travelled to Rome in 1656, and there gave in to pope Alexander VII. a solemn renunciation both of Calvinism and Preadamism. His conversion was not thought to be sincere, at least with regard to this last heresy. His desire to be the head of a new sect is evident; and in his book he pays many compliments to the Jews, and invites them to attend his lectures. Upon his return to Paris he went again into the prince of Condé's service as his librarian. Some time after he retired to the seminary des Vertus, where he died January 30th, 1676, aged eighty-two. He left behind him, 1. A treatise, as singular as it is scarce, entitled Du rappel des Juifs, 1643, in 8vo. The recal of the Israelites, in the opinion of this writer, will be not only of a spiritual nature, but they will be reinstated in the temporal blessings which they enjoyed before their rejection. They will again take possession of the Holy Land, which will resume its former fertility; and their restorer will be a king of France. 2. A curious and entertaining account of Greenland, 8vo. 1647; 3. An equally interesting account of Iceland, 1663, 8vo.; 4. A letter to Philotimus, 1658, in 8vo. in which he explains the reasons of his recantation, &c.

PEYRONIUS (Francis de la), an eminent French surgeon, who practised at Paris with such eclat that he was appointed first surgeon to Louis XV. He improved this favorable situation, and procured to his profession those establishments which contributed to extend its benefits. The Royal College of Surgery at Paris was founded by his means in 1731, was enlightened by his knowledge, and encouraged by his munificence. At his death, which happened at Versailles, 24th of April 1747, he bequeathed to the society of surgeons in Paris two-thirds of his effects, his estate of Marigni, which was sold to the king for 200,000 livres, and his library. He also left to the society of surgeons at Montpelier two houses, with 100,000 livres, to erect there a chirurgical amphitheatre. He was a philosopher without ostentation; his understanding was acute, his natural vivacity rendered his conversation agreeable; and he possessed an uncommon degree of sympathy for those in distress.

PEYROUSE. See PEROUSE.

PEYTAHN, a mountainous irregular district and town in Northern Hindostan, tributary to the Ghoorkhali rajah of Nepaul; situated about 29° of N. lat. It is covered with jungle, and intersected by numerous streams from the hills. The cultivated valleys are very productive, but they are not many. The town stands in lat. 29° 4′ N., long. 82° 15′ E.

PEZAY (N. Masson), marquis of, a native of Paris, was a captain of dragoons; and gave some lessons on tactics to Louis XVI. He died in the beginning of 1778. He left behind him, 1. A Translation of Catullus; 2. Les Soirées Helvetiennes, Alsaciennes, et Franc Comtoises, in 8vo. 1770; 3. Les Soirées Provençales, in MS.; 4. La Rosiere de Salency, a pastoral, in three acts, which has been performed with success on the Italian theatres; 5. Les Campagnes de Maillebois, in 3 vols. 4to., and a volume of maps.

PEZENAS (Esprit), a learned Jesuit, born at Avignon in 1692. He became professor of medicine at Marseilles. His works and translations are numerous, and esteemed for their perspicuity.

PEZENAS, or PESENAS, Piscenna, an ancient town of the department of Herault, France, the chief place of a canton in the arrondissement of Beziers. It is a post-town, with 8300 inhabitants, having a board of trade, an exchange, and a communal college. It is pleasantly situated at the confluence of the Peine and the Herault, in a rich and fertile valley, where cultivated fields, orchards, gardens, and verdant shrubberies meet you on every side. From the platform of its ancient castle there is a most delightful prospect over the little river Peine, which flows under the walls, and, crossing some smiling meadows, falls into the Herault. Pezenas is renowned for the

salubrity of its air; the surrounding country, formerly laid waste by subterraneous fires, presents, in an extent of more than eighteen miles diameter, craters and large masses of basaltic rock. The manufactures of handkerchiefs, linens, muslins, flannels, woollen and cotton counterpanes; hats, soap, wet and dry verdigris; chemicals, and grape sugar, are carried on here; there are likewise cotton and silk spinning-mills; brandy distilleries; wool-washing houses, &c. The trade consists in wheat, rye, oats, yellow grain, red tartar, dyers' weed, olive oil, preserved olives, dry raisins, and figs, capers, fruit, silk, wool, &c. Every Saturday there is a considerable market for wines, brandy, and other spirits. There is a beautiful assembly-room in the town, and charming walks in the neighbourhood, overlooked by rising grounds covered with almond-trees, olives, and vines. Pezenas is eighteen miles north-east of Beziers, and thirty-three south-west of Montpelier.

PEZIZA, cup mushroom, in botany, a genus of the natural order of fungi, belonging to the cryptogamia class of plants. The fungus campanulated and sessile. Linnæus enumerates eight species.

PEZRON (Paul), a very learned and ingenious Frenchman, born at Hennebon in Brittany in 1639, and admitted into the order of Citeaux in 1660. He was a great antiquary, and was author of The Antiquity of Time restored and defended against the Jews and Modern Chronologers. He went through several promotions, the last of which was to the abbey of Charmoye, and died in 1706.

PFEFFEL (Christian Frederick), a modern diplomatist, was born at Colmar in 1726. He studied first under Schœfflin, whom he assisted in his Alsatia Illustrata; and became secretary to the count de Loss, ambassador from Saxony to France. He was then the friend of the count de Bruhl, and employed in several negociations. In 1758 he was sent to Ratisbon, during the diet, as counsellor of state and chargé-d'affaires: thence he proceeded to the court of Bavaria, where he remained until 1768, when he was recalled to Versailles, and became juris-consult to the king. He also obtained, in conjunction with his son, the charge of stett-mestre of Colmar; and was sent by the French ministry to Deux Ponts, to treat of the indemnities of the duke, and other German princes: he was still there when he received the order for his retirement from his public functions; his property was confiscated, and he was placed on the list of emigrants. He died in 1807. His principal works are, Abregé Chronologique de l'Histoire, et du Droit publique d'Allemagne; Recherches Historiques concernant les Droits du Pape sur la Ville et l'Etat d'Avignon, avec des Pièces justificatives; Etat de la Pologne; Dissertations Historiques.

PFEFFERCORN (John), a learned Jew, who was converted to Christianity. He was the author of De Abolendis Judæorum scriptis; and, consistently with the title of that work, endeavoured to persuade the emperor Maximilian to burn all the Hebrew books, except the Bible. He wrote some other tracts also in Latin.

PFIFFER, or PFEIFFER (Augustus), a learned German, born at Lawenburg. He was eight years superintendant of the churches in Lubec, and became professor of oriental languages at Leipsic; where he died in 1698.

PFIFFER (Lewis), a brave Swiss general, in the service of France under Charles IX. With 8000 men, drawn up in a hollow square, he preserved the life of that monarch, in the famous retreat of Meaux, against all the efforts of the prince of Conde. But his chief merit lay in his mechanical and topographical exertions. He made a model of Switzerland, the most extraordinary thing of the kind ever executed. He was elected advoyer, or chief magistrate of Lucerne, and died in that city and office in 1594.

PFINS AND ENZ, a circle of the grand duchy of Baden, lying along the two rivers Pfinz and Enz, from the Rhine to the frontier of Wirtemberg. It includes the north part of the old margraviate, with part of the bishopric of Spire and the Creichgau. Population about 132,000. It is divided into two jurisdictions, including ten bailiwics. The chief town is Bruchsal.

PFORTZHEIM, a town of the west of Germany, in Baden, at the junction of the Wurm and Nagold. It is surrounded with a wall and ditch, and consists of the Town, Old Town, the Aue, and the suburb of Brozingen. The inhabitants manufacture linen, trinkets, and hardware articles. They carry on also a brisk traffic in wood, from the neigbouring forest of Hagenschiess, sent to Holland by the Rhine. Population 5400. Seventeen miles E.S.E. of Carlshrue, and twenty-two W.N.W. of Stutgard.

PHÆA, a famous sow which infested the neighbourhood of Cromyon. Theseus destroyed it as he was travelling from Trœzene to Athens to make himself known to his father. Some imagine that the boar of Calydon sprang from this sow. According to some authors Phæa was a woman who prostituted herself to strangers, whom she murdered, and afterwards plundered.

PHÆACES, the PHÆAGIANS, the people of Phæacia. They first inhabited Hyperia. See HYPERIA. They were noted for their indolence and luxury: hence Horace uses Phæax for a person indolent and sleek; and hence arose their indolence and pride.—*Aristotle.*

PHÆACIA, one of the names of the island Corcyra. See CORCYRA. This island was famous for producing large quantities of the finest flavored apples. Ovid, Juvenal, Propertius. Alcinous was king of it, who rendered his name famous by his gardens and his hospitality to Ulysses. It is now called Corfu. See ALCINOUS, CORCYRA, and CORFU.

PHÆCASIA, one of the Sporades Isles.

PHÆDON, a disciple of Socrates, who had been seized by pirates in his youth; and the philosopher, who seemed to discover something uncommon and promising in his countenance, bought his liberty for a sum of money, and ever after esteemed him. Phædon, after Socrates's death, returned to Elis his native country, where he founded a sect of philosophers, who composed what was called the Eliac school. The name of Phædon is affixed to one of Plato's dialogues.

PHÆDRA, in fabulous history, a daughter of

Minos and Pasiphae; she married Theseus, by whom she was the mother of Acamas and Demophoon. They had lived for some time in conjugal felicity when Venus, who hated all the descendants of Apollo, because he had discovered her amours with Mars, inspired Phædra with the strongest passion for Hippolytus, the son of Theseus, by the amazon Hippolyte. This passion she long attempted to stifle, but in vain; and therefore, in the absence of Theseus, she addressed Hippolytus with all the impatience of desponding love. He rejected her with horror and disdain. She, to punish his coldness and refusal, at the return of Theseus, accused Hippolytus of attempts upon her virtue. He, without hearing Hippolytus's defence, banished him from his kingdom, and implored Neptune, who had promised to grant three of his requests, to punish him in an exemplary manner. As Hippolytus fled from Athens, his horses were suddenly terrified by a sea monster, which Neptune had sent on the shore; and he was thus dragged through precipices and over rocks, trampled under the feet of his horses, and crushed under the wheels of his chariot. When his tragical end was known at Athens, Phædra confessed her crime, and hung herself in despair. She was buried at Trœzene, where her tomb was still to be seen in the age of Pausanias, near the temple of Venus, which she had built to render the goddess propitious.

PHÆDRIA, a small town of Arcadia.—*Paus.*

PHÆDRUS, an ancient Latin writer, who composed five books of fables, in Iambic verse. He was a Thracian; and his being called Augustus's freedman, in the title of the book, shows that he had been that emperor's slave. The fables of Phædrus remained buried in libraries, altogether unknown to the public, until the close of the sixteenth century.

PHÆDRUS (Thomas), a professor of eloquence at Rome, early in the sixteenth century. He was canon of Lateran, and keeper of the library in the Vatican. He owed his rise to the acting of Seneca's Hippolytus, in which he performed the part of Phædra; whence he got the name of Phædrus. He died under the age of fifty. Janus Parrhasius gives a list of several of his works which were almost ready for public view.

PHÆDYMA, the daughter of Otanes, one of the seven Persian conspirators, who, being married to the false Smerdis, discovered his imposture to her father, by his want of ears, which had been cut off by Cambyses. See PERSIA.

PHÆNARETE, the mother of Socrates the philosopher. She was a midwife by profession.

PHÆNIAS, a peripatetic philosopher, a disciple of Aristotle. He wrote a History of Tyrants.—Diog. Laert.

PHÆNNA, one of the Graces.—Paus. ix. 35.

PHÆNOM'ENON, *n. s.* See PHENOMENON. This has phænomena in the plural; Gr. *φαινομενον*. An appearance in the works of nature; a remarkable appearance.

The paper was black, and the colors intense and thick, that the *phænomenon* might be conspicuous.
Newton.

PHÆNOMENON, in philosophy, denotes any remarkable appearance, whether in the heavens or earth, and whether discovered by observation or experiment.

PHAER (Thomas,) M. D., an English physician, born in Pembrokeshire. He graduated at Oxford in 1539. He published several tracts on diseases and their remedies; and was also celebrated as a poet. He translated nine books and part of the tenth into English verse; and died in 1560.

PHÆSANA, an ancient town of Arcadia.

PHÆSTUM, in ancient geography: 1. A town of Crete; 2. A town of Macedonia.—Liv. 36, c. 13.

PHAETON, in fabulous history, the son of Phœbus and Clymene, one of the Oceanides. Venus became enamoured of him, and, entrusted him with the care of one of her temples. This rendered him vain and aspiring; and, having obtained from his father the direction of the chariot of the sun for one day, he was unable to guide the fiery steeds; and, loosing the reins, Jupiter, to prevent his consuming the heavens and earth struck him with a thunderbolt, and hurled him from his seat into the river Eridanus or Po. His sisters Phaetusa, Lampetia, and Phœbe, lamenting his loss upon its banks, were changed by the gods into black poplar trees, and their tears into amber; and Cycnus, king of Liguria, also grieving at his fate, was transformed into a swan. The poets say that, while Phaeton was driving the chariot of his father, the blood of the Ethiopians was dried up; and their skin became black. The territories of Libya were also parched up; and ever since Africa, unable to recover her original verdure and fruitfulness, has exhibited a sandy desert. Some explain this poetical fable thus:—Phaeton was a Ligurian prince, who studied astronomy, and in whose age the neighbourhood of the Po was visited with uncommon heats.

PHAETON, in ornithology, a genus of birds belonging to the order of anseres; the characters of which are:—The bill is sharp, straight, and pointed; the nostrils are oblong, and the hinder toe is turned forward. There are two species, viz.—

1. P. æthereus, the tropic bird, is about the size of a partridge, and has very long wings. The bill is red, with an angle under the lower mandible. The eyes are encompassed with black, which ends in a point towards the back of the head. Three or four of the larger quill-feathers, towards their ends, are black, tipped with white; all the rest of the bird is white, except the back, which is variegated with curved lines of black. The legs and feet are of a vermilion-red. The toes are webbed. The tail consists of two long straight narrow feathers, almost of equal breadth from their quills to their points. 'The name tropic bird,' says Latham, 'given to this genus, arises from its being chiefly found within the tropic circles; but we are not to conclude that they never stray voluntarily, or are driven beyond them; for we have met with instances to prove the contrary.' There are several varieties:—1. One called by Latham the white tropic bird. It is less than the preceding, and is found in as many places. The plumage is in general a silvery white. 2. The yellow tropic

bird is another variety, the plumage being a yellowish white. These differences, Mr. Latham thinks, arise merely from age, if they are not the distinguishing mark of sex. 3. The black-billed tropic bird is smaller than any of the former. The bill is black; the plumage on the upper part of the body and wings is striated, partly black and partly white: before the eye there is a large crescent of black; behind it is a streak of the same; the forehead and all the under parts of the body are of a pure white color; the quills and tail are marked as the upper parts, but the ends of the first are white, and most of the feathers of the last are marked with dusky black at the tips; the sides over the thighs are striated with black and white; the legs are black. 4. The red-tailed tropic bird is in length about two feet ten inches, of which the two tail feathers alone measure one foot nine inches. The bill is red; the plumage white, tinged with an elegant pale rose-color; the crescent over the eyes is somewhat abrupt in the middle; the ends of the scapulars are marked with black. This variety is distinguished by two middle long tailed feathers, which are of a beautiful deep red color, except the shafts and base, which are black: the sides over the thighs are dusky; and the legs are black.

2. P. demersus, the red footed penguin, has a thick, arched, red bill; the head, back part of the neck, and the back, of a dusky purplish hue, and breast and belly white; brown wings, with the tips of the feathers white; instead of a tail, a few black bristles; and red legs. It is found on Penguin Isle, near the Cape of Good Hope, is common all over the South Seas, and is about the size of a goose.

PHAETONTIADES, the sisters of Phaeton. See PHAETON.

PHAETUSA. See PHAETON.

PHÆUS, a town of Peloponnesus.

PHAGEDE'NA, *n. s.* } Fr. *phagedenique*; Gr. φαγεδαινα; from φαγω, to eat. A virulent ulcer: phagedenic and phagedenous mean corrosive; eating into the flesh.
PHAGEDEN'IC, *adj.*
PHAGEDE'NOUS.

A bubo, according to its malignancy, either proves easily curable, or terminates in a *phagedenous* ulcer with jagged lips. *Wiseman.*

When they are very putrid and corrosive, which circumstances give them the name of foul *phagedenick* ulcers, some spirits of wine should be added to the fomentation. *Sharp.*

Phagedenick medicines are those which eat away fungous or proud flesh. *Dict.*

PHAGEDENIC MEDICINES are those used to eat off proud or fungous flesh; such as are all the caustics.

PHAGEDENIC WATER, in chemistry, denotes a water made from quicklime and sublimate, efficacious in the cure of phagedenic ulcers.

PHAGESIA, an ancient festival among the Greeks; observed during the celebration of the Dionysia; so called from the φαγειγ, good eating, that then universally prevailed.

PHALACRINE, an ancient village of the Sabines, where Vespasian was born.—Seut.

PHALÆNA, in entomology, the moth, a genus of insects of the order lepidoptera, having the antennæ gradually tapering from the base to the tips; tongue spiral; jaws none; wings, when at rest, generally deflected.

The caterpillars of this genus vary much as to size, and considerably as to their shape and number of feet. It is remarkable that caterpillars of almost every species of this genus are found with ten, twelve, fourteen, and sixteen feet. The last are the most common. See ENTOMOLOGY.

Moths fly abroad only in the evening, and during the night, and obtain their food from the nectar of flowers. The larva is active and quick in motion, mostly smooth, more or less cylindrical, and it preys voraciously on the leaves of plants. The pupa is torpid or quiescent, more or less cylindrical, pointed at the tip or at both ends; and is generally enclosed in a follicle. The following are the principal divisions of this tribe, according to the Linnæan system. Of the species there are upwards of 1500:—

1. *Bombyx.* Antennæ filiform; two feelers, which are compressed and reflected; tongue short, membranaceous, obtuse, and bifid; the larva is sixteen-footed, often hairy; the pupa is pointed at the tip.

Subdivisions:
a. Wings expanded.
b. ——— reversed.
c. - - deflected.
d. - - incumbent
e. - - convolute.

Dr. Shaw and others have divided the section bombyx into two sections, viz. attaci, and bombyces properly so called.

2. *Geometra.* Antennæ filiform; feelers cylindrical; tongue projected, membranaceous, setaceous, bifid; the larva is from eight to ten-footed, six of which are pectoral, two caudal, and sometimes two sub-caudal; the pupa is pointed at the tip.

Subdivisions.
a. Antennæ pectinate.
b. ——— setaceous.
c. Wings forked.

3. *Noctua.* Antennæ setaceous; feelers compressed, hairy; the tip cylindrical and naked; tongue projecting, horny, setaceous, bifid; larva sixteen-footed; pupa pointed at the tip.

Subdivisions.
a. Wings expanded.
b. ——— flat incumbent, thorax smooth.
c. ——— ———, ——— crested.
d. ——— deflected, thorax smooth.
e. ——— ———, ——— crested.

4. *Hyblea.* Antennæ setaceous; feelers projecting, compressed, dilated in the middle; the lip is projecting and acute.

5. *Hepialus.* Antennæ moniliform; feelers two, reflected, hairy, between which is the rudiment of a bifid tongue; the larva is sixteen-footed, feeding on the roots of plants; the pupa is folliculate, cylindrical, and pointed at the tip.

6. *Cossus.* Antennæ short, filiform; two feelers, very short, cylindrical, reflected.

7. *Pyralis.* Antennæ filiform; the insects of this division have likewise two feelers, which are equal and almost naked; they are cylindrical at the base, the middle is dilated into an oval, and subulate at the tip; the tongue is projected, setaceous, and bifid; the wings are very obtuse, and slightly curved at the exterior margin; the

larva is sixteen-footed, and rolling up the leaves to which it attaches itself.

8. *Tinea*. Antennæ setaceous; four feelers, which are unequal; the larva is found in houses among linen and woollen cloths, and furniture, in which it eats holes, and to which it is very destructive.

9. *Alucita*. Antennæ setaceous; two feelers, that are divided as far as the middle; the inner division is very acute.

10. *Pterophorus*. Antennæ setaceous; two feelers, that are linear and naked; the tongue is excerted, membranaceous, and bifid; the wings are fan-shaped, divided down to the base, and generally subdivided as far as the middle; the larva is sixteen-footed, ovate, and hairy; the pupa is naked, and subulate at the tip.

To describe the species would be impossible; but we shall mention a few.

1. P. alucita pentadactyla. The eyes of this species are black; the body is of a pale yellow. The wings are snow white, and the insect keeps them stretched asunder when at rest. The superior are divided in two, or rather appear composed of two stumps of birds' feathers united at the base. The inferior ones are likewise divided into three threads or bristles, which are furnished on both sides with fine fringes. The caterpillar is of a green color, dotted with black, and charged with a few hairs. It feeds upon grass, changes to a chrysalis about September, and appears a moth in August, frequenting woods.

2. P. attaca pavonia minor. The wings of this insect, says Barbut, are brown, undulated, and variegated, having some gray in the middle, and a margin one line broad; in its color yellowish-gray. The under part has more of the gray cast, but the extremities of the wings before the margin have a broad band of brown. The four wings, both above and beneath, have each a large eye, which eyes are black, encompassed with a dun-colored circle, and above that with a semicircle of white, then another of red, and lastly the eye is terminated by a whole circle of black. Across the middle of the eye is drawn transversely a small whitish line. The caterpillar is green, has sixteen feet with rose color tubercula, charged with long hairs terminated by a small knob; besides which it has dun-color or reddish rings. It is found upon fruit-trees.

3. P. noctua elinguis humuli. In this species the wings of the male are of a snowy white; of the female yellowish, with streaks of a deeper hue; the shoulders, abdomen, &c., in both sexes are deep yellow. The antennæ are pectinated and shorter than the thorax. The caterpillar feeds upon the roots of burdock, hops, &c., changes into a chrysalis in May, appears in the winged state in June, frequenting low marshy grounds where hops grow.

4. P. noctua pronuba spirilinguis. The thorax, head, antennæ, feet, and upper wings, are of a brown color, more or less dark, sometimes so deep as to be nearly black, but often of a bluish cast. The upper wings are moreover somewhat clouded, and have two black spots on the middle, the other towards the outward angle of the lower part of the wing. The under ones are of a beautiful orange color, with a broad black band near the lower edge of the wing, of which it follows the direction. The caterpillar is smooth; to be found on several plants, but particularly upon the thlaspi and some other cruciferous plants. It keeps in concealment during the day, and only feeds by night. Its metamorphosis is performed under ground, and some varieties of color are observable amongst these caterpillars; some being green, others brown; which latter yield males, the former females.

5. P. pentadactyla. Body and wings snowy; upper pair bifid, lower ones three parted. The larva of this species is sixteen-footed, hairy, green, with black dots, and a white dorsal line; the pupa is hairy, green, dotted with black. It appears in August. Its larva feeds on nettles.

6. P. hexadactyla. Wings cleft, cinereous, spotted with brown; all of them are six-parted This species is found on the lonicera xylosteum, or honey-suckle; it is a very elegant and beautiful insect, and often flies into the house in the evening; it makes its appearance in the month of September. It has been called by English collectors the twenty-plumed moth.

PHALÆSIA, a town of Arcadia. Paus. 8.

PHALANGIUM, in zoology, a genus of insects belonging to the order of aptera. They have eight feet, two eyes on the top of the head placed very near each other, and other two on the sides of the head: the feelers resemble legs, and the belly is round. There are nine species; we submit the following, viz.:—

P. opilis of Linnæus. Its body is roundish, of a dusky brown on the back, with a duskier spot of a rhomboidal figure near the middle of it. The belly is whitish; the legs are extremely long and slender. On the back part of the head there stands a little eminence, which has on it a kind of double crest, formed as it were of a number of minute spines; the eyes are small and black, and are two in number. It is commonly called the shepherd spider. This species of spider multiplies singularly. They are great spinners. In autumn the stubble is quite covered with the threads of these spiders, by means of which they travel with ease, and ensnare their prey. However, those threads are thought rather to be the produce of a species of tick called autumnal weaver. A small degree of attention discovers an amazing multitude of those ticks almost imperceptible, and that is their work. The threads, when united, appear of a beautiful white, wave about in the air, and are known in the country by the name of virgin's threads. Some naturalists think that the threads floating in the air serve the insect as sails to waft it through the air, and as a net to entrap insects on the wing; for remnants of prey, say they, are discoverable in them. As to those parcels in which nothing is seen, they are only essays rejected by those travelling insects. The analogy between the phalangium and the crab, and the facility with which it parts with its legs to save the rest of the body, has raised a presumption that its legs might grow again as do those of the crabs and lobsters.

PHALANGOSIS, in surgery, a tumor and relaxation of the eye-lids, often so great as to

deform the eye, and considerably to impede vision. Sometimes the eye-lid when in this state subsides or sinks down, occasioned perhaps either by a palsy of the muscle which sustains and elevates the eye-lid, or else from a relaxation of the cutis above, from various causes. Sometimes an œdematous or aqueous tumor is formed on the eye-lids, so as almost entirely to exclude vision; but this last case should be distinguished from the other, and may be easily remedied by the use of internal and topical medicines, such as purges and diuretics given inwardly, and a compress dipped in warm spirit of wine and lime water. But in the paralytic or relaxed case, the use of cordial and nervous medicines must be proposed internally; and outwardly balsam of Peru and Hungary water are to be employed. If all these fail, the remaining method of cure is to extirpate a sufficient quantity of the relaxed cutis; and then, after healing up the wound, the remainder will be sufficiently shortened.

PHALANNA, a town of Thessaly. Liv. 42. c. 54.

PHALANTHUS, a Spartan, the son of Aracus, and leader of the Parthenii, who founded Tarentum, in Italy. He was shipwrecked on the coast, but was carried ashore by a dolphin.

Phalanthus, a town and mountain of Arcadia. Paus. viii. 35.

PHA'LANX, *n. s.* Fr. *phalange*; Lat. *phalanx*. A troop of closely embodied men.

Here Titus found an extreme difficult piece of work. For this *phalanx*, being a great square battle of armed pikes, was not to be resisted by the Roman targetiers, as long as the *phalanx* itself held together undissolved. *Raleigh.*

Far otherwise the inviolable saints,
In cubic *phalanx* firm, advanced entire,
Invulnerable, impenetrably armed. *Milton.*

The Grecian *phalanx*, moveless as a tower,
On all sides battered, yet resists his power. *Pope.*

A stately superstructure, that nor wind,
Nor wave, nor shock of falling years could move;
Majestic and indissolubly firm!
As ranks of veteran warriors in the field,
Each by himself alone and singly seen,
A tower of strength; in massy *phalanx* knit,
And in embattled squadron rushing on,
A sea of valour, dread, invincible. *Pollok.*

Phalanx, in Grecian antiquity, a square battalion of soldiers, with their shields joined, and pikes crossing each other, so that it was next to impossible to break it. The Macedonian phalanx is supposed to have had the advantage in valor and strength over the Roman legion. It consisted of 16,000 men, of whom 1000 marched abreast, and thus was sixteen men deep, each of whom carried a kind of pike twenty-three feet long. The soldiers stood so close that the pikes of the fifth rank reached their points beyond the front of the battle. The hindermost ranks leaned their pikes on the shoulders of those who went before them, and, locking them fast, pressed briskly against them when they made the charge; so that the first five ranks had the impetus of the whole phalanx, which was the reason why the shock was generally irresistible. But the word phalanx was also used for a party of twenty-eight, and several other numbers; and even sometimes for the whole body of foot. See Legion.

Phalanx is applied by anatomists to the three rows of small bones which form the fingers.

Phalanx, in natural history, is a term which Dr. Woodward and some other writers of fossils have used to express an arrangement of the columns of that sort of fossil coralloid body found frequently in Wales, and called lithostrotion. In the great variety of specimens we find of this, some have the whole phalanx of columns cracked through, and others only a few of the external ones; but these cracks never remain empty, but are found filled up with a white spar, as the smaller cracks of stone usually are. This is not wonderful, as there is much spar in the composition of this fossil; and it is easily washed out of the general mass to fill up these cracks, and is then always found pure, and therefore of its natural color, white. The lithostration, or general congeries of these phalanges of columns, is commonly found immersed in a gray stone, and found on the tops of the rocky cliffs about Milford in Wales. It is usually erect, though somewhat inclining in some specimens, but never lies horizontal. It seems to have been all white at first, but to have been since gradually tinctured with the matter of the stone in which it lies. The single columns, which form each phalanx, are usually round or cylindric, though sometimes flatted and bent; some of them are also naturally of an angular figure; these, however, are not regular in the number of their angles, some consisting of three sides, some of five, and some of seven; some are hexangular also, but these are scarce. They are from five or six to sixteen inches in length; and the largest are nearly half an inch over, the least about a quarter of an inch; the greater number are very equal to one another in size; but, the sides of the columns being unequal, the same column measures of a different thickness when measured different ways; the phalanges or congeries of these are sometimes of a foot or more in diameter. The columns are often burst, as if they had been affected by external injuries; and it is evident that they were not formed before several other of the extraneous fossils; for there are found sometimes shells of sea fishes and entrochi immersed and bedded in the bodies of the columns. It appears plainly hence that when these bodies were washed out of the sea, and tossed about in the waters which then covered the tops of these cliffs, this elegant fossil, together with the stony bed in which it is contained, were so soft that those other bodies found entrance into their very substance, and they were formed as it were upon them. This fossil takes an elegant polish, and makes in that state a very beautiful appearance, being of the hardness of the common white marble, and carrying the elegant structure visible in the smallest lineaments.

PHALARICA, in ancient warfare, was a javelin or long dart, of a particular construction, used by the inhabitants of Saguntum, when they so valiantly stood the siege of it. It was very thick, and had a sharp piece of iron, four feet

long attached to it. It was used either as a weapon of close attack and defence, or as a fire-arm; being, in the latter case, wrapped up in tow and pitch, and, when set fire to, cast out of the balista against the enemy's wooden towers and other machines, for the purpose of consuming them. They were sent with so much force that they pierced through armed bodies of men.

PHALARIS, a remarkable tyrant, born at Crete, where his ambitious designs occasioned his banishment; he took refuge in Agrigentum, a free city of Sicily, and there obtained the supreme power by stratagem. What has chiefly contributed to preserve his name is his cruelty; in one act of which, however, he acted with strict justice. Perillus, a brass founder at Athens, knowing his disposition, invented a new mode of torture. He made a brazen bull, hollow within, bigger than the life, with a door in the side to admit the victims; who being shut up in it, a fire was kindled under it, to roast them to death; and the throat was so contrived that their dying groans resembled the roaring of a bull. The artist brought it to the tyrant, in hopes of a great reward. Phalaris admired the invention, but ordered the inventor to be put into it, to make the first trial. The end of this detestable tyrant is differently related; but it is very generally believed, with Cicero, that he fell by the hands of the Agrigentines; and, as some suppose, at the instigation of Pythagoras. Ovid tells us that his tongue was cut out; and that he was then put into the brazen bull. He reigned, Eusebius says, twenty-eight years.

PHALARIS, Canary grass, in botany, a genus of the trigynia order, belonging to the triandria class of plants: CAL. bivalved, carinated, and equal in length, containing the corolla. There are ten species, of which the most remarkable are,

1. P. arundinacea, the reed Canary grass; and

2. P. Canariensis, the manured Canary grass. These are both natives of Britain. The first grows by the road sides; and is frequently cultivated for the sake of the seeds, which are found to be the best food for the Canary and other small birds. The second grows on the banks of rivers. It is used for thatching ricks or cottages, and endures much longer than straw. In Scandinavia they mow it twice a-year, and their cattle eat it. There is a variety of this cultivated in our gardens with beautifully striped leaves. The stripes are generally green and white; but sometimes they have a purplish cast. This is commonly called painted lady grass, or ladies' tresses.

PHALARIUM, a citadel of Syracuse, where Phalaris's bull was kept.

PHALARUS, a river of Bœotia, running into the Cephisus.

PHALERÆ, among the ancient Romans, were military rewards bestowed for some signal act of bravery. Authors do not agree whether the Phaleræ were a suit of rich trappings for a horse, or golden chains something like the torques, but so formed as to hang down to the breast and display a greater profusion of ornament. The last opinion prevails, but perhaps both are true.

PHALEREUS, a village and port of Athens; this last is neither large nor commodious, for which reason Themistocles put the Athenians on building the Piræus; both joined to Athens by long walls (Nepos). The Phalareus lay nearer the city (Pausanias). Demetrius Phalereus was of this place. See DEMETRIUS.

PHALERIA, a town of Thessaly.

PHALERON, PHALERUM, names given the Phalereus Portus of Athens. See PHALEREUS.

PHALEUCIAN VERSE, in ancient poetry, a kind of verse consisting of five feet; the first of which is a spondee, the second a dactyl, and the last three trochees.

PHALEUCUS, a Roman poet, who invented the phaleucian verse.

PHALLICA, festivals observed by the Egyptians in honor of Osiris, the name is derived from φαλλος, simulacrum ligneum membri virilis. See PHALLUS.

PHALLOPHORI, persons who carried the phallus at the end of a long pole, at the festivals of the PHALLICA. See last article, and PHALLUS. They appeared among the Greeks, besmeared with the dregs of wine, covered with the skins of lambs, and wearing a crown of ivy.

PHALLUS, the morel, in botany, a genus of the order of fungi, belonging to the cryptogamia class of plants. The fungus is reticulated above, and smooth below. There are two species.

1. P. esculentus, the esculent morel, is a native of Britain, growing in woods, groves, meadows, pastures, &c. The substance, when recent, is wax-like and friable; the color a whitish yellow, turning brownish in decay; the height of the whole fungus about four or five inches. The stalk is thick and clumsy, somewhat tuberous at the base, and hollow in the middle. The pileus is either round or conical; at a medium, about the size of an egg, often much larger; hollow within; its base united to the stalk; and its surface cellular, or latticed with irregular sinuses. The magnified seeds are oval. It is much esteemed at table both recent and dried, being commonly used as an ingredient to heighten the flavor of ragouts. We are informed by Gleditsch that morels are observed to grow in the woods of Germany in the greatest plenty in those places where charcoal has been made. Hence the good women who collect them to sell, receiving a hint how to encourage their growth, have been accustomed to make fires in certain places of the woods, with heath, broom, vaccinium, and other materials, in order to obtain a more plentiful crop. This strange method of cultivating morels being however sometimes attended with dreadful consequences, large woods having been set on fire and destroyed by it, the magistrate thought fit to interpose his authority, and the practice is now interdicted.

2. P. impudicus, stinking morel, or stinkhorn, is also a native of Britain, and found in woods and on banks. It arises from the earth under a veil or volva, shaped exactly like a hen's egg, and of the same color, having a long fibrous radicle at its base. This egg-like volva is composed of two coats or membranes, the space between which is full of a thick, viscid, transparent matter, which, when dry, glues the coats together,

and shines like varnish. In the next stage of growth, the volva suddenly bursts into several lacerated permanent segments, from the centre of which arises an erect, white, cellular hollow stalk, about five or six inches high, and one thick, of a wax-like friable substance, and most fetid cadaverous smell, conical at each end, the base inserted in a white, concave, membranaceous turbinated cup, and the summit capped with a hollow, conical pileus, an inch long, having a reticulated cellular surface; its base detached from the stalk, and its summit umbilicated, the umbilicus sometimes perforated, and sometimes closed. The under side of this pileus is covered with a clear, viscid, gelatinous matter, similar to that found between the membranes of the volva; and under this viscid matter, concealed in reticulated receptacles, are found the seeds, which when magnified appear spherical. As soon as the volva bursts, the plant begins to diffuse its intolerable odors, which are so powerful and widely expanded, that the fungus may be readily discovered by the scent only, before it appears to the sight. At this time the viscid matter between the coats of the volva grows turbid and fuscous; and, when the plant attains its full maturity, the clear viscid substance in the pileus becomes gradually discolored, putrid, and extremely fetid, and soon afterwards turns blackish, and, together with the seeds and internal part of the pileus itself, melts away. The fetid smell then begins to remit, the fungus fades, and continues for a short time sapless and coriaceous, and at last becomes the food of worms. The cadaverous scent of this fungus greatly allures the flies; which, lighting upon the pileus, are entrapped in the viscid matter, and perish. We are informed by Gleditsch, that the people in Thuringia call the unopened volvæ by the ridiculous name of ghosts and dæmon's eggs; and that they collect and dry them either in the smoke or open air, and, when reduced to powder, use them in a glass of spirits as an aphrodisiac.

PHALLUS, among the Egyptians, was the emblem of fecundity. It was very fervently worshipped by women, especially by those who were barren. This custom was introduced among the Greeks, and festivals in honor of it were called phallica, or phaluca. See MYSTERIES. Among the Hindoos a similar emblem called lingam is used, and for similar purposes. See HINDOOS.

PHALOS, a term sometimes applied to an ornament placed at the head of the casque of ancient warriors. The Greek λοφος, and the Latin words crista and juba, have each been applied to ornaments of this description.

PHANÆUS, a promontory of Chios, famous for its wines. Liv. xxxvi. c. 43.

PHANAR, a suburb of Constantinople, northeast of the city, towards the sea. Here reside a number of respectable Greek families, the Greek patriarch, &c.

PHANES, a native of Halicarnassus, who was commander of the Grecian auxiliaries, sent to assist Amasis king of Egypt, whom he deserted. See EGYPT.

PHANETA, a town of Epirus. Liv. xxxii. c. 28.

PHANOCLES, an ancient elegiac poet of Greece, who wrote a poem upon an unnatural crime, wherein he supposes that Orpheus was the first who practised it. Some fragments of his poems are extant.

PHANODEMUS, an ancient Greek historian, who wrote on the antiquities of Attica

PHANTASIA, the daughter of Nicarchus of Memphis, in Egypt. It has been said that she wrote a poem on the Trojan war, and another on the return of Ulysses to Ithaca, from which compositions Homer copied the greatest part of his Iliad and Odyssey, when he visited Memphis, where they were deposited.

PHAN'TASM, *n. s.*
PHANTAS'MA,
PHANTAS'TICAL,
PHANTAS'TIC.
Fr. *phantasme, phantasic;* Gr. *φαντασμα, φαντασια.* Vain appearance; something appearing only to the imagination. See FANTASTICAL.

> All the interim is
> Like a *phantasm* or a hideous dream.
> *Shakspeare.*

> This Armado is a Spaniard that keeps here in court
> A *phantasm*, a monarcho, and one that makes sport
> To the prince and his book-mates. *Id.*

They believe, and they believe amiss, because they be but *phantasms* or apparitions. *Raleigh's History.*

If the great ones were in forwardness, the people were in fury, entertaining this airy body or *phantasm* with incredible affection; partly out of their great devotion to the house of York, partly out of proud humour. *Bacon's Henry VII.*

> Why,
> In this infernal vale first met, thou callest
> Me father, and that *phantasm* callest my son.
> *Milton.*

> Assaying, by his devilish art, to reach
> The organs of her fancy, and with them forge
> Illusions, as he list, *phantasms* and dreams. *Id.*

Jesus, in performing his cures and other miraculous works, did never use any profane, silly *phantastic* ceremonies. *Barrow.*

PHANTASM is also sometimes used in a synonymous sense with idea, or notion retained in the mind, of an external object. Locke, who uses this word frequently, tells us that he means the same thing by it as is commonly meant by species or phantasm. Gassendi, from whom Locke borrowed more than from any other author, says the same. The words species and phantasm are terms of art in the Peripatetic system, and from this we are to learn the meaning of them.

PHANTASY, or FANCY, the imagination, sometimes called the second of the powers or faculties of the soul, by which the species of objects received by the external organs of sense are retained, recalled, further examined, and either compounded or divided. See IMAGINATION. Others define the phantasy to be that internal sense or power whereby the ideas of absent things are formed, and represented to the mind as if they were present.

PHAN'TOM, *n. s.* Fr. *phantome.* A spectre; an apparition; visionary appearance.

If he cannot help believing that such things he saw and heard, he may still have room to believe that what this airy *phantom* said is not absolutely to be relied on. *Atterbury.*

As Pallas will'd, along the sable skies
To calm the queen, the *phantom* sister flies.
Pope.

A constant vapour o'er the palace flies;
Strange *phantoms* rising as the mists arise;
Dreadful as hermits' dreams in haunted shades,
Or bright as visions of expiring maids. *Id.*

Restless and impatient to try every overture of present happiness, he hunts a *phantom* he can never overtake. *Rogers.*

Bliss! sublunary bliss—proud words, and vain!
Implicit treason to divine decree!
A bold invasion of the rights of heaven!
I clasped the *phantoms*, and I found them air.
Young.

Then grace the bony *phantom* in their stead
With the king's shoulderknot and gay cockade;
Clothe the twin brethren in each other's dress,
The same their occupation and success. *Cowper.*

PHANUEL, of the tribe of Asher, the father of the prophetess Anna. See ANNA, and Luke ii. 36—38.

PHAON, in fabulous history, a young man of Mytilene, in the island of Lesbos, who received from Venus an alabaster vase filled with an essence which had the virtue of conferring beauty. He had no sooner anointed his body with it than he became the most beautiful of men. The ladies of Mytilene fell desperately in love with him; and the celebrated Sappho threw herself down a precipice, because he would not encourage her passion. He is said to have been killed by a husband who surprised him with his wife. Ovid, in his Epistles, gives a letter from Sappho to Phaon, which Pope has translated into English verse.

PHARA, in ancient geography, a village between Egypt and Arabia Petræa; or, according to Ptolemy, at a promontory situated between the Sinus Heroopolites and Elaniticus of the Red Sea; where Ishmael is said to have dwelt. In Hebrew it is Paran, and in most interpreters; Pharan in the Septuagint and Vulgate.

PHARACYDES, a commander of the Spartan fleet, who assisted Dionysius, tyrant of Syracuse, against the Carthaginians.—Polyæn. 2.

PHARÆ, in ancient geography, three towns, viz. 1. A town of Achaia, in Peloponnesus, on the Pierus. seventy stadia from the sea, and 150 south of Patræ. 2. In Crete (Pliny), a colony from the Pharæ of Messenia.—Stephanus. 3. Pharæ, or Pheræ (Strabo, Ptolemy), or Phara (Polybius), a town of Messenia, on the Nedo (Strabo), on the north side of the Sinus Messenius, and north-west of Abea; anciently read Pharis in Homer (Pausanias, Statius), though now read Phare.

PHARAMOND, the first king of France. He is said to have reigned at Treves, and over a part of France, about A. D. 420, and to have been succeeded by his son Clodio. See FRANCE. The institution of the famous Salique law is generally attributed to him.

PHARAN, or PARAN, the name of the wilderness in the neighbourhood of Phara, adjoining to Kadesh. Also a town of Arabia Petræa, on the Gulf of Suez, formerly a bishop's see, but now much decayed; forty miles north of Tor.

PHARANITÆ, the natives of Pharæ.—Ptolemy.

PHARAOH, Heb. פרעה, i. e. making bare, a common name of the kings of Egypt. Josephus says that in the Egyptian language the word Pharaoh signifies a king; and that those princes did not assume this name till they ascended the throne, when they quitted also their former name. There are ten monarchs of this name mentioned in Scripture, viz.

1. PHARAOH, in whose time Abraham went down to Egypt, when Sarah, who passed only for Abraham's sister, was, by the command of Pharaoh, brought to his palace to become his wife. See ABRAHAM and SARAH.

2. PHARAOH, who reigned when Joseph arrived in Egypt. See JOSEPH and JACOB.

3. PHARAOH, who persecuted the Israelites, and published a decree that all the male children born of Hebrew women should be thrown into the Nile.

4. PHARAOH, before whom Moses performed many miracles, and in whose sight Egypt was visited with ten dreadful plagues. Exod. vii—x. This Pharaoh having at last been compelled to send away the Hebrews, and to suffer them to go out of Egypt, repented of the leave he had given, and pursued them at the head of his army with his chariots. But he was drowned in the Red Sea, wherein he had rashly entered in the eagerness of his pursuit. Exod. xiv. Some historians give us the name of this Pharaoh: Appion calls him Amasis; Eusebius calls him Chenchris; Usher calls him Amenophis.

5. PHARAOH, who gave protection to Hadad, son of the king of Edom, who gave him to wife the sister of his own queen, enriched him with lands, and brought up his son Genubah in his own court. 1 Kings xi. 17—22.

6. PHARAOH, who gave his daughter in marriage to Solomon (1 Kings iii. 1): having taken Gezer, set it on fire, drove the Canaanites out of it, and gave it for a present to Solomon, in lieu of a dowry for his daughter. 1 Kings ix. 16.

7. PHARAOH, or Shishak, who entertained Jeroboam in his dominions when he fled from Solomon. He also declared war against Rehoboam, besieged and took Jerusalem, carried away the king's treasures, and those of the house of God, particularly the golden bucklers that Solomon had made. Some think he was the brother of Solomon's queen, and did this to avenge the neglect of his sister by Solomon. See EGYPT, SHISHAK, aand 1 Kings xiv. 25—29.

8. PHARAOH, with whom Hezekiah made a league against Sennacherib, king of Assyria, A. M. 3290. See SENNACHERIB. He is probably the same whom Herodotus names Sethon, priest of Vulcan, who came to meet Sennacherib before Pelusium, and to whose assistance Vulcan was believed to have sent an army of rats, which gnawed the bow-strings and the thongs of the bucklers of Sennacherib's soldiers. See EGYPT.

9. PHARAOH NECHO, or Nechos, son of Psammiticus, who made war with Josiah, and subdued him. See 2 Chron. xxxv. 20—24. Herodotus also mentions this prince. See EGYPT and NECHO II.

10. PHARAOH HOPHRAH, who entered into an alliance with Zedekiah king of Judah, and attempted to assist him against Nebuchadnezzar

king of Chaldea. Against this Pharaoh Ezekiel pronounced several of his prophecies. See Ezek. xxix. xxx. He is called Apries in Herodotus, I. ii. c. 161. He is also mentioned in Habakkuk ii. 15, 16. See also Isaiah xix. 11, and Jeremiah xlvi. 16, &c. See APRIES and EGYPT.

PHARAON, or FARO, is the name of a game of chance, the principal rules of which are: the banker holds a pack consisting of fifty-two cards; he draws all the cards one after the other, and lays them down alternately at his right and left hand; then the ponte may at his pleasure set one or more stakes upon one or more cards, either before the banker has begun to draw the cards, or after he has drawn any number of couples. The banker wins the stake of the ponte when the card of the ponte comes out in an odd place on his right hand, but loses as much to the ponte when it comes out in an even place on his left hand. The banker wins half the ponte's stake when it happens to be twice in one couple. When the card of the ponte, being but once in the stock, happens to be last, the ponte neither wins nor loses; and the card of the ponte being but twice in the stock, and the last couple containing his card twice, he then loses his whole stake.

De Moivre has shown how to find the gain of the banker in any circumstance of cards remaining in the stock, and of the number of times that the ponte's card is contained in it. Of this problem he enumerates four cases, viz. when the ponte's card is once, twice, three, or four times in the stock. In the first case, the gain of the banker is $\frac{1}{n}$, n being the number of cards in the stock. In the second case his gain is $\frac{(n-2) \times y}{n\,(n-1)} + \frac{2}{n \times (n-1)}$, or $\frac{\frac{1}{2} n \times 1}{n \times (n-1)}$ supposing $y = \frac{1}{2}$. In the third case his gain is $\frac{3\,y}{2 \times (n-1)}$, or $\frac{3}{n \times (n-1)}$, supposing $y = \frac{1}{2}$. In the fourth case the gain of the banker, or the loss of the ponte, is $\frac{2\,n-5}{(n-1) \times (n-3)}\,y$, or $\frac{2\,n-5}{2 \times (n-1) \times (n-3)}$ supposing $y = \frac{1}{2}$. De Moivre has calculated a table, exhibiting this gain or loss for any particular circumstances of the play; and he observes that at this play the least disadvantage of the ponte, under the same circumstances of cards remaining in the stock, is when the card of the ponte is but twice in it; the next greater when three times, the next when once, and the greatest when four times. He has also demonstrated that the whole gain per cent. of the banker, upon all the money that is adventured at this game, is £2 19*s*. 10*d*. See De Moivre's Doctrine of Chances, page 77, &c.

PHAREZ, son of Judah and Tamar (Gen. xxxviii. 27, 28, &c.), so named from the circumstance attending his birth, by his mother Pharez, i. e. one breaking forth. His sons are mentioned in Numb. xxvi. 20, 21; and his posterity down to Joseph and Mary, in Matt. i., and Luke iii.

PHAREZITES, the descendants of Pharez.

PHARI. A valley and fortress in the southern part of Tibet, near the Bootan frontier, named also Parry Jeungh and Parisdong. Lat. 27° 58′ N., long. 89° 1′ E.

The valley of Phari is extensive; and the station of the Phari lama, who is here a sort of prince, being superintendant of a goombah or monastery, and governor of an extensive tract of rocks and deserts, which yield verdure only during the mildest season of the year; at which time this neighbourhood is frequented by large herds of long haired cattle. The musk-deer are also found in great abundance here. There are also partridges, pheasants, quails, and a great multitude of foxes. Winter may be said perpetually to reign in this fortress; the mountain Chumulari is for ever clothed with snow, and from its remarkable form is probably that which is occasionally visible from Phurneah and Rajemall. In the vicinity wheat does not ripen, yet it is sometimes cultivated as forage for cattle. Such is the intensity of the cold here, although in so low a latitude as 28° N., that animals exposed in the open fields are sometimes found dead with their heads split open by frost. In 1792 the Chinese established a military post at this place. The fortress is of an irregular form, but deemed of great strength. On the north-west is an extensive suburb, and on the south a large basin of water.

PHARIS, a town of Laconia.—Paus. iii. c. 10.

PHARISA'ICAL, *adj.* } From Pharisee;
PHARISA'ISM, *n. s.* } Heb. פרם, to separate. Ritual; externally religious.

The causes of superstition are pleasing and sensual rites, excess of outward and *pharisaical* holine , over-great reverence of traditions, which cannot but load the church. *Bacon.*

Suffer us not to be deluded with *pharisaical* washings instead of christian reformings. *King Charles.*

St. Jerome, whom they fondly term their cardinal, compares some popish fashions of his time with the *pharisaical.* *Bp. Hall.*

To some, *Pharisaism* seems rather a several order than a sect. *Id.*

PHARISAISM. Serrarius places the origin of Pharisaism about the time of Ezra; Maldonat makes it only to have arisen a short time before our Saviour's birth. Others, with more probability than either, refer it to the time of the Maccabees.

PHARISEES, a famous sect of the Jews, who distinguished themselves by their zeal for the traditions of the elders, which, they pretended, were delivered to Moses from Mount Sinai along with the law, and therefore both were of equal authority. From their rigorous observance of these traditions, they looked upon themselves as more holy than other men, and therefore separated themselves from those whom they thought sinners or profane, so as not to eat or drink with them; and hence from the Hebrew word פרם, i. e. to separate, they had the name of Pharisees or Separatists. This sect was one of the most ancient and most considerable among the Jews; but its original is not well known. Serrarius places their rise about the time of Esdras, because it was then that the Jews first began to have interpreters of their traditions. Maldonet,

on the other hand, thinks it cannot have arisen among the Jews till a little before the time of Christ. Others, perhaps with more probability, refer the origin of the Pharisees to the time of the Maccabees. Dr. Lightfoot contends, that Pharisaism rose up gradually, from a period which he does not assign, to the maturity of a sect; and it is certain from Josephus, that in the time of John Hyrcanus, the high-priest and prince of the Asmonean line, about 108 years before Christ, this sect was not only formed, but made a considerable figure; as also that it had advanced to a high degree of popularity and power about eighty years before Christ. Calmet places their origin about A. M. 3820, B. C. 184. According to Basnage, Aristobulus, an Alexandrian Jew, and a Peripatetic philosopher, who flourished about 125 years before Christ, and wrote some allegorical commentaries on the Scripture, was the author of those traditions, by an adherence to which the Pharisees were principally distinguished.

This sect was in great repute in the time of our Saviour. They held a resurrection of the body, and supposed a certain bone to remain uncorrupted, to furnish the matter of which the resurrection body was to be formed. They did not, however, believe that all mankind were to be raised from the dead. A resurrection was the privilege of the children of Abraham alone, who were all to rise on Mount Zion; their incorruptible bones, wherever they might be buried, being carried to that mountain below the surface of the earth. The state of future felicity in which the Pharisees believed was very gross: they imagined that men in the next world, as well as in the present, were to eat and drink, and enjoy the pleasures of love, each being re-united to his former wife. Hence the objection stated by the Sadducees, which our Saviour so satisfactorily refuted.—See Matt. xxii. 23—33. The Pharisees seem to have had some confused notions, probably derived from the Chaldeans and Persians, respecting the pre-existence of souls; and hence Christ's disciples asked him concerning the blind man.—See John ix. 2. With the Essenes, they held absolute predestination; and with the Sadducees, free-will; but how they reconciled these seemingly incompatible doctrines is no where explained. The sect of the Pharisees was not extinguished by the ruin of the Jewish commonwealth. The greatest part of the modern Jews are still of this sect; being as much devoted to traditions or the oral law as their ancestors were. See KARAITES, ESSENES, SADDUCEES, &c.

PHARITÆ, people of Pharis. See PHARÆ.

PHARMACA, among the ancients, meant medicated or enchanted compositions of herbs, minerals, &c., some of which, when taken inwardly, were supposed to cause blindness, madness, love, &c.; others infected by touch; such was the garment sent by Medea to Creusa, prepared secundum artem; and others operated upon persons at a distance. Pharmaca soteria were employed as antidotes against these mischievous compositions: thus the herb moly preserved Ulysses from the magical influence of Circe. The laurel, the rhamnus, the flea-bane, the jasper-stone, were used for similar purposes. See Potter's Græc. Ant.

PHARMACI, in antiquity, were two persons who were employed in the lustration or purification of cities. Some say they were both men; but others maintain that a man to represent the males, and a woman to represent the females, performed this office. They performed sacrifice, and wore figs about their necks called ολκαδης; those of the man were blackish, and those of the woman white. Figs were an emblem of fertility.

PHARMACITIS. See AMPELITES.

PHARMACO-CHEMIA, a branch of the chemical art, which treats of the preparation of medicines. It is so named by way of distinction from Spagarico-chemia, a species of chemistry wholly employed about the transmutation of metals by the philosopher's stone.

PHARMACOPŒIA, (from Greek φαρμακον remedy, and ποιειν to make), means a treatise describing the preparations of medicines, with their uses, manner of application, &c. We have various pharmacopœias, as those of Bauderon, Quercetan, Zwelfer, Charas, Bates, Salmon, Lemery, Lewis, &c. The latest and most in esteem are the Edinburgh and London dispensatories. See PHARMACY.

PHARMACOPŒIUS, or PHARMACOPOLA, an apothecary; or a person who prepares and sells medicines. See APOTHECARY. The word is seldom used but by way of ridicule. It is from Greek φαρμακον and πωλειν to sell. See Horace, Satire 2, lib. i. ver. i.

PHARMACUM. Greek φαρμακον. A medicament or medicine; whether of a salutary or poisonous quality

PHARMACY.

PHARMACEU'TIC, *adj.*
PHARMACEU'TICAL,
PHARMACOL'OGIST, *n. s.*
PHARMACOPŒ'IA,
PHARMACOP'OLIST,
PHAR'MACY.

Gr. φαρμακευτικος, φαρμακον, and λεγο; φαρμακον and ποιεω (Fr. *pharmacopée*) φαρμακον and πωλεω, φαρμακον (Fr. *pharmacie*). All from φαρμακον, a medicine. Pharmaceutic and pharmaceutical are, relating to the knowledge or preparation of medicines: pharmacologist, one who writes upon drugs or medicines: pharmacopœia, a dispensatory or book containing rules for making or compounding medicines: pharmacopolist, one who sells them: pharmacy, the art or practice of preparing medicines. See below.

Each dose the goddess weighs with watchful eye,
So nice her art in impious *pharmacy*. *Garth.*

The osteocolla is recommended by the *pharmacologists* as an absorbent and conglutinator of broken bones. *Woodward on Fossils.*

PART I.

PHARMACY may be defined the art of preparing, combining, compounding, and preserving, those substances which are employed in medicine.

Authors who treat of it usually commence their disquisition by engaging in the consideration of chemical principles. Thus the table of arrangement presented by one of the most modern and able writers on the science in question is as follows:—

SECT. I.—Of the more general agents influencing pharmaceutical combinations, including 1. Attraction; *a.* attraction of aggregation; *b.* chemical attraction or affinity; 2. Repulsion. Powers by which it is produced: caloric, light, electricity, and galvanism.

SECT. II.—Of the constitution and combinations of substances. 1. Of solids. 2. Of fluids. 3. Of aëriform substances or gases.

SECT. III.—Of pharmaceutical operations, and the description of the apparatus.

This arrangement of Dr. Thomson is exceedingly perspicuous, and calculated to convey just notions of the principles of the science; but, as the subjects of the two first sections have been considered under the head of CHEMISTRY, we refer our readers to that article, and proceed directly to the more immediate objects of pharmaceutical science: viz. that of effecting changes of an artificial kind in medicinal substances which are presented simple by the hand of nature.

Pharmaceutical operations may be said to be either mechanical or chemical; the first applying to alteration of mode; the second effecting a change of essence. Thus pulverisation, trituration, levigation, granulation, are instances of the mechanical division of bodies; while sifting, washing, filtration, are modes of mechanical separation of their parts; the former being the application of a power or powers to overcome the cohesive force by which the particles of bodies are held together, the bodies still retaining their identity as to quantity, the latter consisting of modes of taking one portion of a mass from another.

The chemical changes effected in substances by pharmaceutical processes are arranged in three classes: 1. Operations which produce changes by a separation of their constituent parts without any manifest decomposition. (It is sometimes difficult to say where mechanical change ceases and chemical change commences, and it is in this link of combination between formative and essential change that the operations in this first division are to be arranged.) 2. Operations in which bodies acting upon each other produce obvious decomposition, or essentially change the nature of such bodies. 3. Operations in which combinations of bodies with oxygen are effected by means of augmented temperature.

MECHANICAL OPERATIONS.

1. *Pulverisation.*—This consists in reducing substances to powder by beating, or forcibly overcoming the aggregative attraction by which the particles of bodies cohere. It is usually performed in mortars, which are made of various materials according to the substances acted upon, for in some cases the materials of the mortar would enter into chemical combination with the matter employed, and thus the process would be interfered with. Mortars are principally made of marble, iron, brass, glass, porcelain, or Wedgewood's ware. Of whatever materials mortars are made, they should be internally at bottom of the form of a hollow hemisphere, and their sides should have such a degree of inclination as to make the substances fall back to the bottom every time the pestle is lifted. The operation, however, is retarded when too great a portion of the ingredients falls under the pestle; hence a large quantity of any substance should not be put into the mortar at a time, and the finer parts should from time to time be removed.

Vegetable matters require to be dried before they can be pulverised; and woods, roots, and barks should be previously cut, chipped, or rasped. When roots are very fibrous, as those of ginger for example, it is advisable to cut them diagonally, which prevents the powder from being full of hair-like filaments. Resins, and gum resins, which soften in a moderate temperature, or in warm weather, should be powdered in cold weather, and only gently beaten to prevent them from running into a paste instead of forming a powder; and when the powdered substance is intended to be dissolved in any menstruum except a pure alkali, the pulverisation is much facilitated by mixing them with a portion of clean well washed white sand. The pulverisation of camphor is assisted by the addition of a few drops of alcohol; sugar is the best addition to aromatic oily substances as nutmegs, mace, &c.; and to the emulsive seeds some dry powder must be added, without which they cannot

be reduced to powder. Metals which are scarcely brittle enough to be powdered, and yet are too soft to be filed, as zinc for instance, 'may be powdered while hot in a heated iron mortar; or metals may be rendered brittle by alloying them with a small quantity of mercury; but as metals are not required to be reduced to the state of very fine powder for pharmaceutical purposes, those processes are seldom performed.'

Trituration as to effect is the same as pulverisation by beating; it is produced by a rotatory motion of the pestle, or upon a large scale by rollers. Dr. Thomson remarks that the fine powders kept in the shops are generally ground in this manner; but there appears to be an error in reducing vegetable matters to the state of impalpable powder; for in this state, both during the process of grinding and afterwards, the air and light act powerfully upon them, and produce changes which, although they are not well understood, yet appear to alter the medicinal virtues of the substances.

Levigation is in fact trituration assisted by the addition of a fluid, which does not act chemically, or as a solvent, upon the material. This process is usually performed upon a flat stone, and the rubbing is effected by a muller of the same material with the stone. Earths are thus prepared for pharmaceutical purposes, and also some of the metals. Water or spirits of wine, or some unctuous material, are usually employed in levigation, and the substances used in the operation are for the most part previously pulverised.

Granulation is used for the mechanical division of some of the metals. The substance is melted or beaten into fine leaves, and then stirred briskly until it cools; or it is poured in its melted state into water, and stirred or agitated till it cools. The process is called granulation, on account of the metallic particles being separated by it in the form of small grains.

Rasping and filing scarcely need be mentioned as modes of dividing substances.

Sifting consists in separating the finer from the coarser parts of substances, by causing the former to pass through apertures in sieves formed of iron wire, hair cloth, or gauze. For very light and valuable powders it is necessary to employ close sieves, otherwise a great deal of the matter would be lost in the agitation.

Washing or *elutriation* consists in agitating the material in a fluid which does not act upon it as a solvent, but merely suspends it. The liquor containing thus the finer particles of the material is poured off from the sediment, and suffered to remain at rest for some time, when these fine and washed particles gradually settle, and the supernatant water is poured off, or drawn from the material by a syphon.

Filtration is a species of fluid sifting; filters are generally made of fine close flannel, or linen, or unsized paper, called filtering paper. When these are large it is usual to form them into a conical bag, and suspend this bag from a hoop or frame. When paper is employed it is doubled up in the shape of a cone, and inserted into a funnel; it is often requisite to introduce glass rods between the paper and the funnel, in order to prevent the sides of the paper and funnel from being so closely in contact as to interfere with the percolation. When very acrid liquors, such as the strong acids and alkalis, require filtration, the glass funnel that is employed is partly filled with powdered quartz, and sometimes sand placed over this, so arranged that the coarser materials shall be at the bottom of the funnel, and the finer on the surface. The substance to be filtered is poured on the surface of the sand slowly, which it passes through, as also the lower substrata, and thus are the impurities of the liquor left behind.

Expression is a species of filtration: but in this last case force is employed. Expression is principally employed to obtain the juices of fresh vegetables, and the unctuous vegetable oils. The material is first beaten or bruised, then enclosed in a bag, not completely filled, and subjected to pressure between the plates of a screw press. The pressure should be applied gradually.

Vegetables treated in this manner ought to be perfectly fresh; and they should for the most part be subjected to the pressure immediately upon being bruised, for the bruising disposes them to ferment. But subacid fruits yield more juice, and of a better quality, when they are permitted to stand a few days in a wooden or earthen vessel previous to pressure. Sometimes, when the vegetable matter to be expressed is not very juicy, the addition of a little water is necessary. It is proper to peel oranges and lemons before they are pressed, in order to prevent the essential oil of the rind from mixing with the expressed juice. For unctuous seeds iron plates are used in expression, and the bruised seeds may be previously subjected in a bag to the steam of hot water.

Despumation is employed in the instance of fluids being so thick and clammy as not to pass with facility through a filter. The liquor is heated, and thus throws up a scum, which is to be carefully removed; or more generally whites of eggs are employed in the process of despumation; this entangles the impurities of the fluid, and rises up with them to the surface. In the case of clarifying spirituous liquors isinglass may be employed, for the process which coagulates in the spirit without the assistance of heat, and forms a scum which descends to the bottom of the vessel, and carries the impurities with it.

'Besides the above methods of mechanically separating the parts of substances from one another, fluids of different specific gravities, mixed together, are separated by means of the separatory funnel. It is chiefly used for separating the essential oils from the water with which they are entangled during their distillation. The funnel is first stopped at the bottom, and then filled with the mixed fluids, the heaviest of which gradually subsides into the narrow part below; and when the cork at the bottom is taken out, and the stopper above a little loosened, it flows out; by which means the lighter is easily obtained in a separate state. Some of the essential oils are heavier, others lighter than water; but both can be thus separated with equal facility.'

The above quotation is from Dr. Thomson; and in what follows respecting the chemical

operations of pharmacy we shall be principally indebted to the publication of that author.

The changes of which we have above spoken, as in some sort holding an intermediate place between mere formative and absolutely essential alteration, are effected by 1st, Caloric, inducing liquefaction, fusion, evaporation, exsiccation, distillation, rectification, dephlegmation, sublimation; by 2d, Water, and other fluids, causing solution, lixiviation, maceration, digestion, infusion, decoction, extraction; 3d, By other chemical agents inducing coagulation.

Calorific changes. Liquefaction.—This term is applied to that operation by which certain bodies, when exposed to a moderate heat, are rendered fluid after passing through several intermediate states of softness. Fat, lard, wax, resin, and many other similar bodies, undergo liquefaction; which is therefore employed in pharmacy to facilitate the combination of these bodies in the formation of ointment. The best vessels for conducting the process of liquefaction are earthenware pans.

Fusion differs from liquefaction in the sudden change from the solid to the fluid state, which those bodies which are liable to it suffer on exposure to heat. There are no intermediate states of softness; but the fusible body, when heated to a certain point, immediately assumes the fluid form. This point differs very considerably in different solids; but in general simple substances are less fusible than compounds; and some of the simple earths cannot be fused without the addition of some other substances to promote their fusion. These are generally saline bodies, and are denominated fluxes. Fusion is usually performed in crucibles, the best of which are made of very pure clay or potter's earth. They are made of various forms, three cornered, or round, and fitted with covers.

Crucibles are also made of cast-iron, of fine silver, and of platina. The first, however, are destroyed when saline substances are melted in them; and when made red hot in a current of air are apt to suffer oxidation; but in other respects they are durable, and can sustain sudden alternations of heat and cold without cracking. Some of the metallic crucibles combine many of the best qualities necessary for this set of instruments; particularly those of platina: which, however, are too expensive for ordinary use.

Evaporation is the dissipation of a liquid by means of heat, and is employed in pharmacy generally with the view of obtaining in a separate state any fixed substance which may be combined with water or some other evaporable fluid. Thus, by exposing an aqueous solution of a salt to a certain degree of heat, the caloric which combines with the water renders it volatile, and disperses it in the form of an elastic aëriform fluid; while the particles of the salt, being brought nearer to each other, and within the sphere of their mutual attraction, reunite, and the salt is obtained in its concrete state. In spontaneous evaporation the air is the principal agent, the dissipation being independent on artificial caloric or increased temperature. It is easy to conceive that the process of evaporation is only had recourse to when the part of the body which is thus dissipated is of little value; when a solid is to be separated from a more valuable fluid, such as alcohol, distillation and not evaporation is employed.

Evaporating dishes are made of different materials; the best are those of biscuit porcelain made by Wedgewood. When glass or earthenware dishes are employed the heat is best applied through the medium of sand; or, if a still more moderate heat be necessary, by means of boiling water over which the evaporating dish should be placed. The first is named a sand-bath; the second a water-bath. Evaporating dishes in the general way should be flat-bottomed and shallow, so as to expose a large surface to the action of the applied heat.

Exsiccation is a variety of evaporation. It is generally employed for depriving salts of their water of crystallisation. The bodies to be exsiccated are heated in an iron ladle or pot, and undergo first what is called the watery fusion, that is, are heated and dissolved in their own fluid; this fluid, by continuing the process, is evaporated, and the body is left in the form of a dry mass. When the substances to be exsiccated are liable to decomposition in a temperature above 212°, as is the case with some of the compound oxides, the process must be conducted by the heat of a water-bath.

Distillation is also a species of evaporation, differing from it only in this, that the vapor of volatile matter, instead of being dissipated and lost in the air, is collected and condensed in close vessels. Some of the vessels used in this process will be found in the plates appended to the article CHEMISTRY. The simplest is the retort and receiver. The common still is a well known apparatus. It consists of two parts, the boiler, and the head or capital. The boiler, which is the part to which the fire is applied and contains the materials, is of a cylindrical shape, and may be sunk in a furnace or immersed in a water-bath when the temperature requires to be nicely regulated. The head or capital is a large hollow globe, the upper part of which is drawn out into a tapering pipe bent to a curve or arch, and terminating in the serpentine or worm. These parts are generally made of copper; but the worm is a long pewter pipe of a decreasing diameter which winds in a spiral direction obliquely through a deep tub filled with cold water. The body, head, and worm require to be luted together; but in general slips of paper dipped in flour, paste, or pieces of wet bladder, are sufficient for this purpose. In this apparatus the vapors are raised into the head, whence they pass into the worm, where they are condensed and issue in drops from the lower end of the pipe. By degrees the water in the refrigeratory becomes warmed and requires to be renewed, and thence the necessity of the tube being furnished with a stop-cock, by which the heated water may be drawn off without disturbing the apparatus. As in this species of distillation the vapor ascends before it is condensed, it is named distillation per ascensum. The distillation by the retort or cucurbit is named distillation per latus.

In some cases, as in the distillation of several essential oils, the vapor, instead of passing laterally or ascending, is forced to descend. To produce this effect a plate of tinned iron is fixed within any convenient vessel so as to leave a space beneath it; and, the materials to be distilled being laid upon this, they are covered by another plate, accurately fitted to the sides of the vessel, and strong enough to support the fuel which is burnt upon it. By this means the volatilised matter of the materials under the fire is forced into the lower cavity of the vessel and there condensed. This mode of distillation is denominated distillation per descensum. For an account of Woulfe's apparatus, and its modifications, see plates of CHEMISTRY.

Rectification is the repeated distillation of any product obtained by distillation, when it is not perfectly pure. This second operation is carried on at a lower temperature, so that the more volatile parts only are raised and pass over into the receiver, leaving the impurities behind. When the fluid is simply rendered stronger, as in the case of alcohol, by bringing over the spirit and leaving behind the superfluous water, the operation is named dephlegmation, or concentration. When the liquid is distilled off from any substance the process is called abstraction; and cohobation if the product be redistilled from the same materials, or from a fresh parcel of the same materials.

Sublimation is a species of distillation in which the product of volatilisation is condensed in a solid form; but, as this condensation takes place at a higher temperature than that of watery vapor, a much more simple apparatus is required. The process is conducted sometimes in a crucible, with a cone of paper or another crucible inverted over it, in which the product is condensed; and, as in this case it is light and spongy, it was formerly denominated flowers. For other matters which are less volatile a cucurbit and capital, or a flask and phial, are employed, and sunk about two-thirds in a sand-bath. In these cases the product is a solid, and is denominated a sublimate.

CHANGES BY THE ACTION OF FLUIDS.

Solution.—For an account of the laws and circumstances of this process, see the article CHEMISTRY.

Lixiviation.—When a saline body consists of both soluble and insoluble ingredients, the solvent of the former, acting upon the salt, produces lixiviation, which process, when conducted on a great scale, is generally performed in large tubs or vats having a hole near the bottom containing a wooden spigot and faucet. A layer of straw is placed at the bottom of the tub, over which the substance is spread, and covered by a cloth; after which hot or cold water, according as the salt is more or less soluble, is poured on. The water, which soon takes up some of the soluble parts of the saline body, is after a little while drawn off by the spigot; and a fresh portion of water is successively added and drawn off until the whole of the soluble matter is dissolved. The straw in this operation acts as a filter, and the cloth prevents the water from making a hollow in the ingredients when it is poured on, by which it might escape without acting on the whole of the ingredients.

In smaller operations lixiviation may be conducted in glass matrasses, and the lie, which is the name given to the solution, filtered through paper in a glass funnel.

By *maceration* soluble portions of substances, chiefly of a vegetable nature, are obtained in solution; these substances being immersed in cold water or in spirituous fluids for a sufficient length of time. It is frequently employed as a preparation for infusion and decoction, which are always rendered more effective by the previous maceration of the materials.

Digestion is similar to maceration, except that in this last case the power of the fluid is assisted by a gentle heat. It is usually performed in a glass matrass, and the evaporation of the liquid impeded by stopping the mouth of the matrass slightly with a plug of tow, or tying over it a piece of wet bladder perforated with small holes. When the menstruum is valuable, as alcohol for instance, another matrass with a smaller mouth may be inverted over the former and the joinings secured by a piece of wet bladder; or, what is perhaps preferable, a long open glass tube may be luted to the mouth of the matrass which contains the materials. By these means any part of the liquor which is resolved into steam by the heat is condensed and conveyed back upon the materials. The matrass may be either heated by a common fire, or a lamp, a water-bath, or a sand-bath; and, when either of the latter is used, the matrass should not be sunk deeper in the water or the sand than the portion that is filled. The process has been denominated circulation, when the condensed vapors are returned upon the ingredients.

Infusion is intended chiefly to extract the volatile and aromatic principle of vegetables, which would be dissipated by decoction or digestion; and also those parts of vegetables which are more readily soluble in water, as gum, sugar, extract, tannin, the salts and part of the resin from the insoluble parts. The water is poured boiling hot on the materials, sliced, or reduced to a coarse powder, and kept in a closely covered vessel till they are cold, when the infusion or liquor is decanted off for use. Infusions are sometimes effected with cold water; but for the most part these though more grateful are weaker than the infusions by heat.

Decoction, or boiling, is employed with advantage to extract the mucilaginous parts of plants, as well as their bitterness and several other vegetable principles which do not easily yield to mere infusion. It is generally performed in slightly covered vessels; but when the menstruum is valuable, as alcohol for instance, a retort and receiver, or the common still may be used, in the body of which the decoction is prepared, while the vapors, which otherwise would escape, are condensed and preserved.

Extraction.—If the liquor obtained by either infusion or decoction be subjected to evaporation the watery part is dissipated, and the part which is extracted by it is obtained in the solid form, and is denominated an extract. It is obvious

enough that extract of some materials will not contain the whole of the principles of those meterials.

Changes by Chemical Agents.

Coagulation.— This is the conversion of a fluid into a solid of more or less consistency. The means employed to effect this are increase of temperature, alcohol, acids, and runnets. The effect appears to arise from a new arrangement of particles produced by the affinity exerted between the solid particles contained in the fluid and the coagulating substance.

Changes produced by the Chemical Action of one set of Bodies on another.

Decomposition.—This implies the separation of the component parts of bodies from one another. It is produced in some cases by heat so as to overcome the affinity of aggregation. Electricity or Galvanism may also effect decomposition; but in the greater number of instances it is the result of a superior affinity that holds the principles of the substance about to be decomposed in union, and produces new compounds.

In pharmaceutical operations decomposition is very frequent, and it is of the utmost importance for the prescribers of medicine to be acquainted with its general circumstances.

Dissolution.—This differs from mere solution by its being necessarily accompanied by some change in the nature of the dissolved body. In general effervescence is caused by the process, the disengaged materials becoming extracted in a gaseous form. The making a common saline draught is an instance of dissolution.

Precipitation.—Here also decomposition occurs, but the substance extricated is thrown down instead of otherwise separating itself. The material used to produce this separation is called the precipitant, and the separated substance the precipitate. It is necessary for the prescriber to be acquainted with those substances which, when mixed with others, produce precipitation, otherwise he will often be foiled in attempting the combination of incompatible principles. The following table of precipitants is extracted by Dr. A. T. Thomson, from the System of Chemistry by Dr. Thomas Thomson; all the substances not employed in pharmacy being omitted:—

1. Alkalies.		Precipitants.
Potash	.	Tartaric acid.
Soda	.	0
Ammonia	.	Fixed alkalies.
2. Alkaline Earths.		
Barytes	.	Sulphuric acid, sulphates.
Lime	.	Oxalic acid, oxalates.
Magnesia	.	Phosphoric acid, phosphate of soda (not direct).
3. Earths Proper.		
Alumina	.	Ammonia, hydro-sulphuret of potassa.
4. Metallic Oxides.		
Silver	.	Muriate of soda.
Mercury	.	Muriate of soda.
Copper	.	Iron.
Iron	.	Succinate of soda, benzoate of soda.
Lead	.	Sulphate of soda.
Zinc	.	0 alkaline carbonates ?
Antimony	.	Water, hydro-sulphuret of potassa.
Arsenic	.	Nitrate of lead.
5. Acids.		
Sulphuric	.	Muriate of barytes.
Carbonic	.	Muriate of an alkaline earth.
Boracic	.	Sulphuric acid.
Nitric	.	0
Acetic	.	0
Benzoic	.	Muriatic acid.
Succinic	.	Sulphate of iron.
Oxalic	.	Muriate of lime.
Tartaric	.	Potassa.
Citric	.	Acetate of lime.

In some cases where decomposition is effected by the addition of another substance, the separated body is not precipitated, but rises to the surface, and is thence denominated a cream: thus, by the addition of any acid to a solution of soap, the alkali unites with the acid, while the oil is separated and swims on the surface of the liquor.

Crystallisation.—See Chemistry.

Fermentation.—For an account of those changes which vegetable substances undergo when separated from the living plant, and placed under certain circumstances so as to act upon one another; and for the different compounds and principles which are severally the results of the vinous, acetous, and putrefactive fermentations, whether naturally occurring or artificially produced, see also the article Chemistry.

Having thus premised an account of the general principles of pharmaceutic science, with its application to medicinal purposes, we now proceed to detail the several processes ordered in the London and Edinburgh Pharmacopœias; and in this, the main part of the present article, we shall follow the plan adopted by Dr. A. T. Thomson, giving first the translations of the directions ordered by the colleges, and then some few remarks on the qualities of the composition. In respect to that portion of the treatise which relates to the incompatibility of one substance with another, Dr. Thomson will be wholly our guide. It should, however, be premised that chemical niceties may in some few instances succumb before actual observations on the effects of compounds.

We do not include the articles of the Dublin Pharmacopœia, fearing too great extension of the paper; and we may here take occasion to say that it is much to be lamented that one general prescription is not adopted throughout the whole of the united kingdom. In an appendix, however, will be found some of the more recent remedies, principally of the French school, which the Dublin college has recently adopted.

PART II.

ACIDS.

In the article Chemistry, and under the word Acid, will be found remarks on the principle of acidification and the composition of acids. It will there be seen that all acids having been supposed compounds of oxygen with certain bases, the name of the particular acid was taken from

the base, and the terminations *ic* and *ous* were employed to indicate the degree of oxidation, or rather of acidification; thus sulphur combined with a particular measure of oxygen was named sulphureous acid, with a greater quantity, or to a saturating point, sulphuric. The recent changes which chemistry has undergone have materially modified these the Lavoisierean principles of composition and nomenclature; but they are to a certain extent correct, and have been received by the framers of the Pharmacopœias.

In the following account of the acids, the alphabetical arrangement will be adopted according to the London Pharmacopœia; but it may be right in the first place to copy Dr. Thomson's table of arrangement, according to their radicals or bases:—

1. Acids composed of a simple radical and Oxygen.

Sulphur	1. Sulphuric acid.
Azote	2. Nitrous acid.
	3. Nitric acid.

. Acids composed of a compound Radical and Oxygen.

Carbon and hydrogen	1. Acetic acid.
	2. Citric acid.
	3. Benzoic acid.
	4. Succinic acid.

3. Acids composed of a simple radical and Chlorine.

Hydrogen	1. Muriatic acid.

Acidum aceticum dilutum. London.—Diluted acetic acid.

Let dilute acetic acid be distilled from a glass retort into a glass receiver kept cool; let the first pint be thrown away, and preserve the six succeeding pints.

Acidum aceticum tenue. Edinburgh.—Weak acetic acid.

Distil eight pounds of vinegar in a glass vessel with a gentle heat. Throw away the pound which first comes over; and the five pounds which follow will be the weak acetic acid. The distillation may be continued so long as a colorless acid comes over; but this, being too much burnt and unfit for internal use, may be mixed with the pound that first comes over, and kept for various chemical purposes.

Of the appellations given to this preparation Dr. Thomson considers that of the Edinburgh College the only unobjectionable one; the preparation being the acetic acid in a more diluted state than that in which it exists in vinegar, but purer, being freed in a great degree from the mucilage, extractive, supertartrate of potassa, and other extraneous matters which vinegar contains.

Qualities.—Distilled vinegar ought to be colorless and transparent, and of a specific gravity from 1·007 to 1·0095. Its taste is pungent, and purely acid. It is sometimes adulterated with sulphuric acid; but the adulteration may be detected by a precipitate being produced when acetate of barytes in solution is added. When lead and tin are the adulterating materials, the addition of a solution of sulphureted hydrogen throws down a dark-colored precipitate; if copper have been employed in the adulteration, the acid will become blue by being supersaturated with ammonia.

Medical properties.—It is fitter for pharmaceutical purposes than common vinegar, on account of its greater purity, and from not being liable to decomposition. Its medical uses are the same.

Acidum aceticum forte. Edinburgh.—Strong acetic acid.

Take of sulphate of iron dried one pound, superacetate of lead ten ounces. Having rubbed them together, put them into a retort, and distil in a sand-bath with a moderate heat, so long as any acid comes over.

This acid differs from distilled vinegar only in being stronger and purer. Acetic acid may also be prepared by applying a decomposing temperature to the metallic acetates, which was formerly ordered to be done by the London College, or by mixing the sulphuric acid with the acetate, or by mixing the acetates and sulphates together.

Qualities.—Acetic acid is very pungent to the taste; it has a grateful odor; it is very volatile; its specific gravity is 1·063. It unites with water in any proportion; and, during the mixture, heat is evolved.

Medical properties.—It is rubefacient when applied to the skin, and may be employed to produce speedy vesication; but it is principally used for correcting impurities in the air, and as a refreshing scent in cases of faintness or hysteric affection.

Acidum benzoicum. London.—Benzoic acid. Take of benzoin one pound; put it into a glass vessel placed in a sand-bath, and subjected to a heat of 300° gradually augmented; sublime until nothing more ascends; press the matter sublimed between bibulous paper, that the oil may be separated; then sublime again with a heat not raised above 400°.

Edinburgh.—Take of benzoin twenty-four ounces, subcarbonate of soda eight ounces, water sixteen pounds. Triturate the balsam with the subcarbonate; then boil them in water for half an hour, constantly agitating them. Strain. Repeat the boiling with other six pounds of water, and strain. Mix the strained liquors and evaporate them to two pounds. Again filter, and drop into it diluted sulphuric acid so long as any precipitation is produced.

Dissolve the precipitated benzoic acid in boiling water; strain the solution, while still hot, through linen, and set it aside to crystallise. Wash the crystals with cold water; then dry and preserve them.

Qualities.—Benzoic acid possesses an agreeable taste, rather pungent, and a fragrant smell. It appears in the form of feathery flocculent crystals, quite white, and of a silky character. Its specific gravity is 0·657. When heated it gives out a strong suffocating vapor. It is soluble in twenty-four times its weight of boiling water. Cold alcohol takes about one half its weight; boiling alcohol its own weight.

Medical properties.—Not much used in medicine, although retained in the pharmacopœias; its medicinal efficacy is indeed questionable; it forms an ingredient in the compound tincture of camphor of the London, and of the ammoniated tincture of opium of the Edinburgh College.

Acidum citricum. London.—Citric acid.

Take of lemon juice a pint; prepared chalk an ounce, or sufficient to saturate the juice; diluted sulphuric acid nine fluid ounces. Add the chalk gradually to the lemon juice heated, and mix them; then pour off the liquor. Wash the citrate of lime which remains in repeated quantities of warm water, and then dry it. Pour on the dried powder the diluted sulphuric acid, and boil for ten minutes; then strain the liquor through a linen cloth by strong pressure, and filter it through paper. Evaporate the filtered liquor with a gentle heat, so that crystals may form in cooling. In order that the crystals may be obtained pure, let them be dissolved in water a second and a third time, filtered each time, and set apart for crystallisation.

In this process it is obvious enough that the lime of the chalk unites with the citric acid existing in the lemon juice, and forms an insoluble citrate of lime, which is decomposed by the sulphuric acid, leaving the citric acid free.

Qualities.—The crystals should be white and transparent; they are without smell, but are of a caustic sharp taste. They are soluble in water. When adulterated with tartaric acid, the adulteration may be detected by addition to the solution of them of nitrate, sulphate, or muriate of potassa, or saturating it with carbonate of potassa, when, if the tartaric acid be present, an insoluble super-tartrate of potassa will appear in small bright crystals; should citrate of lime still remain among the crystals, it is detected by dissolving them in water, saturating the solution with ammonia, and adding to it some oxalate of ammonia, which will precipitate the lime. If sulphate of potassa be present, it will be discovered by the solution yielding a precipitate with muriate of barytes, this being insoluble in muriatic acid.

Medical properties.—The same as lemon juice; in some particulars being superior, in others inferior. It wants the freshness of the acid immediately from the fruit, but it is much more convenient for extemporaneous use than common lemon juice. It is said to equal this last in strength when dissolved in eight waters. Nine drachms and a half of the crystals to a pint of water is the proportion that Dr. Thomson gives for the formation of lemon juice, and we copy from him the following table, showing the quantity of citric acid required to decompose one scruple of the alkaline salts mentioned in it.

Alkaline Salts.	Citric Acid.
Carbonate of soda . . .	gr. x.
Subcarbonate of soda . .	gr. xij.
Carbonate of potassa . .	gr. xv.
Subcarbonate of potassa .	gr. xviij.
Subcarbonate of ammonia	gr. xxvj.

A solution of one scruple in a pint of water, sweetened with sugar that has been rubbed on fresh lemon peel, forms a grateful refrigerant beverage, resembling lemonade, and which is equally useful in febrile and inflammatory complaints.

Acidum muriaticum. London.—Muriatic acid.

Take of dried muriate of soda two pounds, sulphuric acid twenty ounces by weight, distilled water a pint and a half. First mix the acid with half a pint of the water in a glass retort, and add the muriate of soda after the mixture is cold. Pour the rest of the water into the receiver; then having fitted on the retort placed in a sand bath, distil the muriatic acid over into this water with the heat gradually raised to redness.

The specific gravity of this acid is 1·160, and 100 grains of it are saturated by 124 grains of the subcarbonate of soda in crystals.

Edinburgh.—Take of muriate of soda which has been previously exposed to a red heat, sulphuric acid and water of each two pounds. Pour the acid mixed with eight ounces of the water and cooled upon the muriate of soda in a glass retort, to which a receiver is to be adapted containing the remainder of the water; then distil from a sand-bath with a moderate fire. In a short time the vessels may be luted together, and the distillation continued to dryness. The specific gravity of this acid is 1·170.

'These processes were formerly explained by saying that the decomposition of the muriate of soda is affected by the superior affinity of sulphuric acid for soda, aided by the affinity of the muriatic acid for soda being weakened by the heat, which favors its tendency to assume the elastic form, in which state it passes over into the receiver, and is there condensed by the water. But, as the doctrine of chlorine is now admitted, we must adopt the following explanation of Sir Humphry Davy, who regards dry common salt as a compound of thirty-six parts of chlorine and twenty-four of sodium, and consequently containing neither muriatic acid nor soda. In the processes of the Pharmacopœias, therefore, for obtaining muriatic acid, the water of the sulphuric acid is decomposed, its oxygen unites to the sodium, and forms soda, which, combining with the sulphuric acid, produces a sulphate of soda; while the hydrogen of the decomposed water combines with the chlorine and forms hydrochloric acid, or muriatic acid gas: a gaseous fluid consisting of equal volumes of hydrogen and chlorine, or by weight, of hydrogen 2·7, chlorine 97·3, in 100 parts, which dissolving in the water contained in the receiver constitutes the liquid acid. The residue of the process is sulphate of soda with an excess of acid; to separate which, without breaking the retort, boiling water may be poured into the retort after its contents have cooled down to 212°.' See Chemistry and Acid.

Qualities.—The liquid acid thus obtained is nearly colorless, with a very caustic taste and a pungent odor. 'According to the new nomenclature the muriatic acid of the shops is hydrochloric acid, or, to retain the common name, hydro-muriatic acid. The real acid contained in the liquid acid is a compound of equal volumes of chlorine and of hydrogen. The fluid muriatic acid found in the shops often contains sulphuric acid with small portions of iron and sometimes copper; the first is diluted by di-

luting the acid with five or six parts of distilled water, and adding a few drops of muriate of barytes, which is precipitated white if sulphuric acid be present; iron is discovered by saturating the diluted acid with carbonate of soda, and adding prussiate of potassa; if a blue precipitate be formed, it may be concluded that iron is present. A blue color being produced by supersaturating the acid with ammonia detects copper.'

Medical properties.—'This acid is tonic and antiseptic. It has been efficaciously used in typhus fevers, and in some cutaneous eruptions. It is a common and useful adjunct to gargles in the proportion of from f. ʒß. to ʒij. in f. ℥vi. of any fluid in ulcerated sore throats and scarlatina maligna; and in a very highly diluted state, viz. ♏viij. in f. ℥iv. of water, it has been recommended as an injection in gonorrhœa.

This acid has even been regarded as an antidote in general syphilitic affections; but the observations of Mr. Pearson have shown this opinion to be erroneous; yet, by its salutary effects on the stomach and general health, it is a medicine capable of ameliorating the appearance of venereal ulcers, and restraining for a time the progress of the disease, where it is desirable to gain a little time previously to entering on a mercurial course. The dose is from ♏x. to ♏xx., in a sufficient quantity of water, or in any bland fluid. It is incompatible in prescriptions with alkalies, most of the earths, oxides, and their carbonates; sulphuret and tartrate of potassa, tartarised antimony and iron, nitrate of silver, and acetate of lead. In typhus, and fevers of a typhoid type, 'I have,' says the author whom we are now quoting, 'generally given it in the infusion of cinchona or cusparia bark. Dr. Paris states that he has found it a preventive of the generation of worms, when given after copious evacuations of the bowels. Largely diluted in any mucilaginous fluid, and sweetened, it is a useful remedy in calculous cases, depending on an excess of the phosphates.

'When muriatic acid is taken as a poison it may be detected by its sensible qualities; but, if mixed with wine or other fluids, let a portion of it be distilled from a small retort over a candle into a phial containing a solution of nitrate of silver. The precipitation of muriate of silver, which is soluble in ammonia, but not in nitric acid, will take place if the poison contain muriatic acid. The best antidotes if exhibited in time are soap and calcined magnesia suspended in water.

'A very important property of muriatic acid in the state of gas is the power it possesses of neutralising putrid miasmata, discovered by Morveau in 1773. It is therefore used as an agent for destroying infection in sick rooms and hospitals disengaged by pouring sulphuric acid on common salt.' Thomson. See the article MEDICINE.

Acidum nitricum. London.—Nitric acid. Take of nitrate of potassa dried, and sulphuric acid, each by weight two pounds; mix them in a glass retort, and distil the nitric acid from a sand bath until red vapors are produced. Then, having added an ounce of dry nitrate of potassa, redistil the acid in a similar manner.

The specific gravity of this acid is 1·500. 100 grains are saturated by 212 grains of crystals of subcarbonate of soda.

Edinburgh.—Take of nitrous acid any quantity, put it into a retort; and, having fitted a receiver which must be kept cold, apply a very gentle heat, until the reddest part shall have passed over, and the acid which remains in the retort, already almost free from color, have become nitric acid.

Acidum nitrosum. Edinburgh.—Nitrous acid. Take of nitrate of potassa bruised two pounds, sulphuric acid sixteen ounces. Pour the acid upon the nitrate of potassa in a glass retort, and distil from a sand-bath with a gradually increased heat until the iron pot become of an obscurely red heat.

The specific gravity of this acid is 1·520.

These processes do not always ensure the absolute purity of nitric or nitrous acid, inasmuch as the nitrate of potassa itself may not be quite free from contamination; but the medicinal properties of the materials are not affected by these slight impurities.

Qualities.—The nitrous acid of the Edinburgh Pharmacopœia is orange-colored and fuming; it consists of nitrous gas in a state of loose combination with nitric acid and water.

The liquid nitric acid is of an exceedingly pale yellow color, nearly indeed colorless. It is volatilised by heat, and light decomposes it. Its constituents, independent of water which gives it its fluid form, are stated to be 25·93 azote, and 74·07 oxygen, in 100 parts; or one volume of azotic gas and two volumes and a half of oxygen gas. The strongest fluid acid contains twenty-five per cent. of water, and seventy-five of dry acid.

Acidum nitricum dilutum. London.—Diluted nitric acid.

Take of nitric acid a fluid ounce; distilled water nine fluid ounces. Mix.

Acidum nitrosum dilutum. Edinburgh.—Diluted nitrous acid.

Take of nitrous acid and of water equal weights. Mix, avoiding the noxious vapors.

'These processes are intended for the more convenient apportionment of the dose in the exhibition of this acid. In the former editions of the London Pharmacopæia, the proportions of acid and water were equal by weight; but the alteration in the present edition makes a very important difference of strength in a given measure of the diluted acid, prepared after the first and the last of the above formulæ.'

When prepared, according to the directions of the London College f. ℥j contains about grs. 68 of nitric acid, of 1·500 specific gravity, and will saturate 114 grains of crystallised subcarbonate of soda; while the same measure of the same acid, prepared after the Edinburgh and Dublin, and the former London formulæ, contains grs. 390·5 of the same acid; a difference which may lead to errors in practice; and is therefore to be regretted, particularly as no reason is assigned for the change.

Medical properties.—Nitric acid is tonic and antiseptic. When very largely diluted with water it forms an agreeable and very useful beverage

in fevers, particularly of the typhoid type. In larger doses, less diluted, it has been efficaciously administered in chronic hepatitis, even when dropsy has supervened, and has also been found serviceable in restraining violent sickness in dyspepsia, asthmas, and the majority of the cachexiæ. From some observations of Dr. Scott, published at Bombay, in 1796, this acid excited considerable attention as a remedy for syphilis; but after the most ample trials, by almost every practitioner of any eminence in the country, its antisyphilitic powers have not been found by any means to answer the accounts of them transmitted from India. The subsequent publications of Dr. Scott, however, have shown that he did not employ nitric acid, but a mixture of three parts of muriatic and two of nitric. It checks for a time the progress of the disease, but does not permanently remove the symptoms; and, as Mr. Pearson justly observes 'it would by no means be warrantable to substitute the nitrous (or nitric) acid in the place of mercury for the cure of venereal complaints.' It is, however, in many cases, of much benefit during a mercurial course or prior to its commencement, when the constitution is impaired and inadequate to support the effects of mercury; as by its tonic powers it promotes the general health, and lessens the action of the mercurial remedy on the mouth and fauces; yet when it is pushed too far, it affects the mouth and produces ptyalism. When dropsy supervenes on reiterated courses of mercury, which is not unfrequent in broken-down constitutions, this acid Mr. Carmichael observes, given in as large doses as the stomach will permit conjoined with digitalis, is productive of the utmost benefit. We have found it of considerable service, given at the same time with mercury in old obstinate ulceration of the legs, although no venereal taint could be suspected; and it is employed with benefit as a local stimulant in the form of lotion, in the proportion of f. ʒij of the diluted acid to Oj of water, to fetid ulcers attended with a thin ichorous discharge, and in caries of the bones. In India, and in this country for some years past, nitric acid has been used combined with muriatic in the form of a bath (see MEDICINE), and in this state produces a slight excitement of the skin, a peculiar taste in the mouth, and in other respects merely the same effects as when it is taken internally; but the chief perceptible effect of the mixed acid is on the bowels, which it keeps moderately open. Diluted nitric acid has often been employed as a poison. It is detected by the orange colored spots which are observed on the lips, chin, and hands of the patient; and, if death be the result, by the same color being found in a large portion of the alimentary canal, the mucous membrane of which is converted into a fatty substance, and the stomach often perforated. If any of the fluid can be obtained, the extrication of orange colored fumes on boiling it over copper filings is a certain test of aqua-fortis. Soap and calcined magnesia suspended in water are the best antidotes.

The dose of the diluted acid is from ♏x. to ♏xxx. in f. ℥iij. of water, given three or four times a day. When used as a bath, the mixed acid should be added to the water, until it is about as sour as weak vinegar.—Nitric acid, even when diluted, is incompatible in prescriptions with oxides, earths, alkalies, the sulphurets and the acetates of potassa, and of lead. It decomposes the two last named salts, and forms nitrates of lead and potass. We have thus been copious in our accounts of the acids—of the muriatic and nitric,—and have extracted largely from Dr. Thomson, for the reasons intimated above in respect to the first; and because the last (as we have seen) has been proposed, and extensively and mistakenly, but at the same time usefully, administered, as a counteractive of the syphilitic poison, and of the constitutional affections which that poison at different times engenders.

Acidum succinicum. Edinburgh.—Succinic acid.

Take of powdered amber and pure sand, each of equal parts; mix them together and put them into a glass retort, of which they may fill one half. Having adapted a large receiver, distil from a sand-bath with a gradually increased heat. A watery liquor with a little yellow oil will first come over, then a yellow oil and an acid salt; and lastly, a reddish and black oil. Pour the liquor out of the receiver, and let the oil be separated from the water. Press the acid salt collected in the neck of the retort and on the sides of the receiver between folds of bibulous paper, that it may be freed from the adhering oil; then purify it by solution in hot water and crystallisation.

Sand is ordered to be used in these preparations, to prevent the amber which swells much from passing over into the receiver.

Qualities.—When the crystals of the acid are pure they are white and shining; they have an acid taste, and are highly volatile. They are partly soluble in cold water, but more readily in hot water, and in alcohol. The sulphuric and nitric acids also dissolve them without producing decomposition.

When succinic acid is adulterated with tartaric acid, the adulteration may be detected by carbonate of potass. Nitrate of silver detects muriate of ammonia, and the sulphate of potassa would be found by barytic water.

Medical properties.—Very little use is at present made of this acid in medicine, although it would seem to possess stimulating and probably expectorant virtues.

Acidum sulphuricum dilutum. London.—Diluted sulphuric acid.

Take of sulphuric acid a fluid ounce and a half, distilled water fourteen fluid ounces and a half. Let the acid in mixing be gradually added to the water.

Edinburgh.—Take of sulphuric acid one part, water seven parts; mix them.

Dr. Thomson expresses his regret that when the London College in the last edition of the Pharmacopœia altered the proportion of the acid and water, they did not adopt those of Edinburgh and Dublin, so that there might have been a standard strength for the whole kingdom; at present one fluid ounce of the London contains eighty grains of the strong acid, while in the Edinburgh and Dublin pharmacopœias it constitutes an eighth part.

The heat generated during the mixture of the acid and water is guarded against by the gradual admixture; and the diluted acid being purer than the strong from the circumstance of not being able to hold in solution some sulphates which the latter contains, the Dublin College have very properly ordered the decanting of the clear liquor from the sediment.

Medical Properties.—Tonic, refrigerant, antiseptic, and in some cases astringent. It is a very useful medicine in some chronic disorders of the skin; and in hæmorrhagic affections it is often highly beneficial. Dose from ♏x. to ♏xxx.

Acidum sulphuricum aromaticum. Edinburgh.—Aromatic sulphuric acid.

Take of alcohol two pounds, sulphuric acid six ounces. Drop the acid gradually into the alcohol. Digest the mixture in a covered vessel with a very gentle heat for three days; then add one ounce and a half of bruised cinnamon bark, and one ounce of bruised ginger root. Digest again in a close vessel for six days; then filter through paper placed in a glass funnel.

This seems but little more than a simple solution of ginger and cinnamon in alcohol and sulphuric acid, very little of the ethereal principle being generated from the admixture of the alcohol and acid.

Qualities.—The odor is aromatic, taste a grateful acid, and color rather brown.

Medical properties.—Aromatic as well as tonic, and therefore especially applicable to stomach affections. We should have liked to have seen it adopted by the London College, inasmuch as the sulphuric acid is very often highly serviceable in dyspeptic disorders, and the aromatic additions make it more applicable in these complaints.

Acidum tartaricum. London.—Tartaric acid.

Take of supertartrate of potassa two pounds and a half, distilled water three gallons, prepared chalk one pound, sulphuric acid one pound. Let the supertartrate of potassa be boiled with two gallons of distilled water and the prepared chalk be gradually added until bubbles cease to be produced. Let the mixture be set apart that the tartrate of lime may subside; pour off the fluid and wash repeatedly the tartrate of lime with distilled water until it come off tasteless. Then pour upon the tartrate the sulphuric acid diluted with a gallon of the boiling distilled water, and set the whole apart for twenty-four hours, occasionally stirring it. Filter the liquor and evaporate it in a water-bath to obtain the crystals.

The lime in this preparation separates the tartaric acid from the potassa, and then again yields it up to combine with the sulphuric acid. If a little acetate of lead is dropped into a small portion of the liquor, before it is set aside for crystallising, a precipitate will be produced if any sulphuric acid still remains, and then a little more of the tartrate of lime should be added.

Qualities.—The crystals are white, without smell, and exceedingly acid. It is readily soluble in water. It forms tartrates with alkalies and earths.

Medical properties.—Refrigerant; when added in solution to a solution of carbonate of soda, a good substitute for common soda water is formed.

Appendix to the Acids.

We shall here use the freedom of extracting the whole of what Dr. Thomson has introduced into his valuable Dispensatory under the above title.

'In the following appendix,' says Dr. T., 'I propose to give a short account of two acids, which although they have not a place in any of the British Pharmacopœias, yet are of great importance; the one being a remedy of considerable efficacy in a certain class of diseases, and the other demanding the attention of the medical practitioner from the frequent employment of it as a poison.

1. *Acidum hydrocyanicum.* Hydrocyanic (Prussic) acid.—This acid is found in many vegetable productions, such as the bark of the prunus padus, or bird cherry; the leaves of the peach and nectarine trees, bitter almonds, and the kernels of many fruits; but for the purposes of medicine it is artificially prepared.

Preparation.—The best method of preparing hydrocyanic acid for medicinal use is the following, which was first employed by Scheele.

Mix two ounces of Prussian blue with six ounces of red precipitate of mercury, and add six ounces of water. Boil the mixture for some minutes, constantly agitating it, when the blue liquor will disappear, and the mass assume a yellowish gray hue. Pour the whole on a filter, and wash the residuum with a little hot water, which is to be added to the filtered liquor. Pour this upon an ounce and a half of clean iron filings, and add three drachms of strong sulphuric acid. Shake this mixture well, and, after the powder subsides, pour the fluid into a retort, and distil one-fourth part of it over into a well luted receiver. This is the hydrocyanic acid containing an admixture of a little sulphuric acid which is readily separated by means of barytic water. La Planche recommends one-sixth only to be distilled over, and this to be rectified by means of a gentle fire over $\frac{1}{200}$ of carbonate of lime, drawing off afterwards three-fourths only of the one-sixth of the whole thus treated, by a second distillation. The acid is obtained of a uniform strength by this method.

In the above process the iron filings and the sulphuric acid, added to the solution obtained from boiling the mixture of Prussian-blue and red precipitate of mercury in water, decompose the water, and the reduced mercury combines with the cyanogen, the base of the acids of the Prussian-blue, and forms a cyanuret of mercury. This new combination is again destroyed by heat, and the cyanogen acting upon the nascent hydrogen of the decomposing water forms hydrocyanic vapors, which are absorbed by the water in the receiver, and constitute the hydrocyanic acid.

Physical and chemical properties.—Hydrocyanic acid prepared in the above described manner is a colorless, transparent liquid, with a peculiar odor not unlike that of bitter almonds. It is at first bland and sweet to the taste, but ultimately impresses a pungent acrimony on the

palate. It is very volatile; and owing to this property crystallises if a drop of it fall upon paper. Its specific gravity is 0·996.

It is decomposed by a high temperature and by light, being resolved into carbonic acid, ammonia and carbureted hydrogen gas, which are dissipated, and leave behind a carbonaceous deposit. It should therefore be kept in an opaque stoppered bottle. It is very inflammable, burning with a blue flame, and is soluble both in water and in alcohol. According to Gay Lussac it consists of a peculiar base which he has named cyanogen, acidified by hydrogen. Cyanogen is a compound consisting of two proportionals of carbon and one of nitrogen. But the acid employed in medicine contains one part only of the acid referred to by Gay Lussac, and eight parts and a half of water.

Medical properties and uses. — Hydrocyanic acid when taken into the stomach in large doses acts as an instantaneous and most powerful sedative, destroying completely the nervous energy and the irritability of the body, and consequently extinguishing life; but in an animal thus killed the action of the heart continues for some time after the animal has apparently ceased to live. The observation of this curious fact led professor Bern, in 1809, to administer prussic acid as a remedy in pulmonary inflammation, and he found that it quickly subdued the violence of the disease 'without having any recourse to more than preliminary bleeding.' British practitioners, however, were altogether unacquainted with this remedy until after Dr. Majendie published his first essay on this subject in 1815; when Dr. Granville, through the medium of the London Medical Repository directed their attention to its powers; and I refer those who are desirous of tracing the introduction of prussic acid into use, as a medical agent, to his work (Dr. T. here refers to a Treatise on the Internal use of hydrocyanic acid, second edition, London, 1820).

Prussic acid, internally exhibited, is a remedy of great efficacy in spasmodic coughs of every description, particularly asthma, chronic catarrh, and hooping cough. It has also been employed with success in palpitations of the heart. (London Medical and Physical Journal, November 1823.) In my own practice I have witnessed its powers in that affection of the trachea which is often mistaken for phthisis pulmonalis, and is not less fatal. In true tubercular phthisis my own experience does not enable me to say much in favor of prussic acid; but the mass of evidence brought forward in testimony of its beneficial influence in this disease by Dr. Granville should not be overlooked; and, as I have stated in another place (vide Dr. Granville's Treatise, second edition, p. 370), the judicious exhibition of prussic acid in the early stages of pulmonary consumption, may do much to bring that disease under the control of art. Prussic acid has been found extremely useful in the treatment of those epidemic catarrhs with which this country is occasionally visited; and no remedy is so well adapted as an adjunct to tonics for removing those dyspeptic affections which are attended with acidity of the stomach, and accompanied with heat and soreness of the tongue. In these cases it reduces the morbid irritability of the stomach, and thereby enables the juices of that organ to be more slowly secreted, and of a more healthy character. [Here Dr. Thomson introduces the following note:—Dr. Elliotson has published a small volume containing the result of his practice with prussic acid in dyspepsia, and has stated that accident led him to try the powers of the medicine in this class of diseases. Respect for my own character obliges me to say that nothing could surprise me more than this statement of Dr. Elliotson, as he acknowledges having read the first edition of Dr. Granville's treatise, which contains a letter from me, dated the 20th of February, 1819, stating my sentiments of the utility of prussic acid in dyspepsia, and the modus operandi of the remedy proviously to his having employed it.]

Its beneficial effects in asthma and in hooping cough are also well established. M. Haller recommends it in aneurism of the heart and aorta. (Vide Traité de la nécessité de ne point insister sur l'usage interieur des excitans dans l'empoisonnement par l'acide hydrocyanique. Par. H. S. Haller, Paris, 1824.) Cases are also on record in which this acid has proved serviceable in the treatment of painful and difficult menstruation, floodings, hæmoptysis, and nervous diseases. It certainly is a very powerful sedative, and may be employed in all cases in which sedatives and narcotics are indicated with decided advantage.

As a local remedy, prussic acid is the only application which can be depended on for allaying the itching and tingling which are so distressing in impetiginous affections. I have lately employed it with unvarying success in these complaints; and having published my observations (vide Medical and Physical Journal, February 1822), I am in hopes of having its value determined in the hands of others. I have found it useful also in combination with small doses of oxymuriate of mercury in acute rosacea, and several other cutaneous diseases.

The dose of prussic acid is from ♏ij. to ♏viij. It may be administered in distilled water, or in almond emulsion, or in infusion of cinchona bark, as circumstances may require. When an over dose has been taken, its deleterious effects are best counteracted by hot brandy and water, and the ammoniated tincture of iron M. Haller recommends bleeding, ammoniacal frictions, and acidulated drink; but more reliance is to be placed on stimulants. As a local application it may be used in the form of lotion, in the proportion of a fluid drachm to a fluid ounce and a half of distilled or of rose water, or as a cataplasm, composed of crumbs of bread, soaked in a solution of a f. ʒiß of the acid in f. ℥j. of distilled water. It is incompatible in prescriptions with nitrate of silver, the salts of iron, and the mineral acids.

Although the instantaneous power of prussic acid, in destroying animal life, when it is taken in doses sufficiently large to operate as a poison, may perhaps always prevent medical art from proving beneficial in such cases; yet it is of

importance to be able to ascertain, in judicial enquiries relative to suicide or to murder, that prussic acid has been administered as a poison. This may be done if the animal be opened from eighteen to forty-eight hours after death. The following means pointed out by Dr. Granville for detecting its presence in the animal system after death should be known:—Collect the blood contained in the ventricles of the heart, a portion of the contents of the stomach, and any fluid that may be found in the head, the chest, or the abdomen; agitate the mixture for some time with distilled water, and filter the liquid, taking care to preserve the whole at a low temperature. To a small quantity of the filtered liquid add a few drops of a solution of pure potassa in alcohol; then add a few drops of a solution of sulphate of iron, and if a reddish precipitate of the color of burnt terra siena now fall down, which, on the addition of a little sulphuric acid, changes to a bluish-green, and gradually on exposure to the atmosphere becomes a beautiful blue, we may conclude that the death of the individual has been occasioned by prussic acid. The stomach is first to be examined entire, to ascertain whether the odor of that acid is perceptible in it; after which it is to be cut in pieces under distilled water, and a portion of it distilled with an equivalent portion of the water until one-eighth of the liquid has passed into the receiver. That liquid is to be rendered slightly alkaline with potassa; then a few drops of a solution of sulphate of copper is to be added to a small portion of it, and afterwards a sufficient quantity of muriatic acid to redissolve the excess of the oxide of copper. The liquid will appear more or less milky according to the quantity of hydrocyanic acid present. This test will detect $\frac{1}{20000}$ of hydrocyanic acid in solution in water.

[In addition to the statement of the medical virtues possessed by this acid as above made by Dr. Thomson, we may add that it will in some cases of pain from a carious tooth be found exceedingly useful. In its application care must be taken to convey a drop or two of the acid or a less limited quantity of the solution recommended by Dr. T. into the hollow of the tooth, and its good effects will sometimes prove instantaneous.]

2. *Acidum oxalicum.*—Oxalic acid.

Oxalic acid exists ready formed in many vegetable and some animal bodies. Combined with potassa it is found in the leaves of the oxalis acetosella, and corniculata, rumex acetosa, and geranium acidum, and with lime in the roots of rhubarb, valerian, and many other plants. Berthollet procured it from honey, hair, tendons, albumen, and some other plants; but that which is found in the shops manufactured for the purposes of art is produced artificially by the action of nitric acid on sugar. The following process, which was first described by Bergman, is still adopted for the production of oxalic acid.

Into a tubulated retort put one ounce of white sugar, pour over it three ounces of strong nitric acid of specific gravity 1·567. When the whole is dissolved boil the liquor until it ceases to afford nitrous fumes and acquires a reddish brown color; then add three ounces more of nitric acid, and continue the boiling until the fumes cease, and the color of the fluid disappear. Empty the contents of the retort into a wide vessel, and upon cooling a crystallisation will take place, which is oxalic acid. On boiling the lixivium with two ounces of nitric acid in the retort until the red fumes almost disappear, a second supply of crystals will be obtained. 100 grains of sugar, when properly treated, yield fifty-eight grains of crystallised oxalic acid. The rationale of the process is very obvious, the nitric acid is partially decomposed, and yields up a portion of oxygen which is one of its components to the sugar, which is a compound of oxygen, carbon, and hydrogen, and by this addition of oxygen is converted into oxalic acid. The relative proportions of these components of sugar is oxygen 49·4, carbon 44·5, and hydrogen 6·1, in 100 parts; that of oxalic acid, oxygen 64, carbon 32, and hydrogen 4, in 100 parts.

Qualities.—The crystals of oxalic acid when they are properly prepared are four sided prisms with the sides alternately larger, terminated at their extremities by dihedral prisms. They are white, transparent, inodorous, have a very acrid sour taste, and redden all the vegetable blues except indigo. One grain of oxalic acid communicates a sensible acidity to 2633 grains of water. The crystals dissolve in twice their weight of water at 65°, and in their own weight of boiling water. Alcohol at a mean temperature dissolves forty parts of them, and boiling alcohol fifty-six parts. They are sparingly soluble in ether. The crystals are in a state of a hydrate, 100 grains containing fifty-two only of acid, and forty-eight of water.

Oxalic acid combines with alkalies, earths, and metallic oxides, forming oxalates. Muriatic and acetic acids dissolve it without alteration; but it is decomposed both by sulphuric and nitric acids aided by heat.

Medical properties and uses.—Oxalic acid in small doses, when it is dissolved in a large quantity of water sweetened with sugar, forms an agreeable cooling beverage, which may be used in febrile diseases in the same manner, and with the same intention, as lemonade. It may also be employed to check an external hæmorrhagy, which it appears to do by charring the blood as it issues from the wound, and thereby mechanically stopping its flow. It is a virulent poison when swallowed in large doses, and, from the resemblance of its crystals to those of sulphate of magnesia, many fatal accidents have occurred for mistaking oxalic acid for that purgative salt. The acid taste of the one salt and the bitter taste of the other would always prevent such accidents, were individuals to taste their medicines before swallowing them; but, besides the occurrence of accidents, oxalic acid has of late been too frequently employed by the wretched suicide for the purpose of self-destruction. It is, therefore, important that every medical practitioner should be acquainted with the qualities of oxalic acid, its effects on the animal economy, and the means

of counteracting these when it has been taken in a sufficient dose to operate as a poison.

The exact extent of oxalic acid which may be taken with impunity has not been determined; but its poisonous properties are more or less virulent according to the degree of dilution of the dose. From some experiments on animals which I made ten years since, and the published details of the appearances in dissection of several fatal cases of poisoning by oxalic acid, I was led to form an opinion that 'the primary morbid action of this poison is on the stomach itself, on the coats of which its chemical action occasions the organised animal solid to enter into new combinations, and thence produces a decomposition, both of the acid and the part to which it is applied;' that the acid, however, also enters into the circulation by absorption; but, 'that the proximate cause of death by oxalic acid is the suspension of the functions of the heart and brain, which are sympathetically affected by the local injury done to the stomach.' (London Medical Repository, vol. iii. p. 386.) The subject has since been investigated with much care and great ingenuity by Dr. Christison and Dr. Coindet, and their observations published in the Edinburgh Medical Journal, vol. xix. p. 163. From the labors of these gentlemen I am induced to change my opinion as to the extent of the injury done to the living stomach, and to believe that the pultaceous state of that organ which was found by me in my experiments on dogs, is to be attributed to the action of the acid on its coats after death. I am, however, still of opinion, that death is less to be attributed to the sedative power of the poison acting on the brain and spine, to which it is carried by absorption, than to the sympathetic action on the nervous system from the local injury of the stomach, an opinion according with their first conclusions, that 'oxalic acid when introduced into the stomach in large doses and highly concentrated irritates it, or corrodes it, by dissolving the gelatine of its coats; and death takes place by a sympathetic injury of the nervous system.'

The general symptoms attending poison by oxalic acid are, burning pain in the stomach; violent and incessant vomiting, the matter ejected being commonly dark colored, and sometimes bloody; in some cases there have been violent gripings and purgings; the pulse soon sinks and becomes almost imperceptible, and this state is followed by deadly coldness of the limbs, attended with lividity of the fingers, and nails, and clammy sweats; convulsions, but not in every instance, and insensibility, precede death. With regard to appearances after death, no particular change in the external state of the body has been noticed. On opening the body, the stomach is found generally to contain a quantity of dark colored fluid, which is probably extravasated blood charred by the poison; in some instances the coats of the stomach have been found greatly injured, presenting appearances of great vascularity, thickening of the mucous coat, the rugæ pultaceous and easily wiped off, and in some cases the other membranes have been found tender and even perforated, so that the contents of the organ have escaped into the cavity of the abdomen. The lungs and heart have not been often examined; but, in the lower animals killed by oxalic acid, both have presented indications of inflammation having existed in them, particularly the lungs. The vessels of the brain have been found turgid.

The fatal effects of poisoning by oxalic acid are so rapid that little opportunity is afforded of counteracting them by medical art. The first object certainly, in every case, is to evacuate the poison from the stomach, and when the stomach pump is at hand it should be instantly employed. The vomiting which usually supervenes precludes the necessity of employing emetics; and copious dilution, which in other cases of corrosive poison is advisable, is more likely to promote the absorption of the acid, and consequently increase its powers. Before, therefore, emetics are employed, if they should be deemed necessary, the activity of the poison should be weakened by altering its nature by some substance with which, in chemically combining, its solubility is diminished. That chalk produces this effect I discovered in making the experiments already alluded to, and several instances have since occurred in which its administration has saved the lives of individuals poisoned by oxalic acid. The lime of the chalk unites with the oxalic acid, and forms an oxalite which is perfectly inert. Magnesia may be employed instead of chalk, and it has the advantage of not inconveniencing the patient by the extrication of carbonic acid gas, which is copiously evolved when the chalk unites with the acid; but as the oxalate of lime is more insoluble than the oxalate of magnesia, and consequently more inert, it may be questioned whether the inconveniences of the gas may be equivalent to the greater security from the employment of chalk. A mixture of chalk and water, or of magnesia and water, should therefore be instantly given when oxalic acid has been taken in a large dose; and, after the local effects of the poison have been counteracted, the system should be supported by cordials combined with opium, and the oxalate afterwards be carried out of the system by the aid of purgatives.

To obtain legal evidence in cases of poisoning by oxalic acid when none of the poison is found, we may be guided to suspect the nature of the poison by the symptoms and the post mortem appearances; but a correct opinion can be formed only by an analysis of the vomited matter, the contents of the stomach and its coats. For this purpose, the vomited matter and the contents of the stomach should be separately diluted with distilled water, and the coats of the organ itself boiled in distilled water. These solutions should then be separately filtered and decolorised with chlorine, and subjected to the following tests. If oxalic acid be present, hydrochlorate (muriate) of lime will occasion a precipitate which is soluble in a small quantity of nitric acid, but not in muriatic, unless a very large quantity of the acid be used. Sulphate of copper throws down a bluish-white precipitate in any fluid containing free oxalic acid, which is insoluble in hydrochloric acid; and nitrate of silver occasions a heavy white precipitate, which, when dried and heated over the flame of a candle on the point of

a spatula, becomes brown at the edge, then suddenly fulminates, and is all dissipated in white fumes. This is a very delicate test; for Dr. Christison informs us that, from a quarter of a grain of oxalic acid dissolved in 4000 parts of water, he and Dr. Coindet procured enough of the oxalate of silver to show its fulmination twice. (Edinburgh Medical Journal, vol. xix. p. 198.)

Alkalies and Salts.

Under the word Alkali, and in the article Chemistry, will be found definitions of alkalies and statements of those recent discoveries, more especially of Sir H. Davy, which have thrown new light on their composition. We may here repeat that the general properties of these bodies are those of combining with acids forming neutral salts in which the qualities of both the components are lost, of changing the blue colors of vegetables to green, and of combining with oil into a soapy matter which thus occasions, to a certain extent, the union of oil and water. Alkalies also have an acrid urinous taste; are exceedingly caustic, so much so as to corrode or dissolve animal matter; they have a great affinity for water, which, in some cases, they abstract so rapidly and readily even from the atmosphere, that it is necessary to keep them in well-stopped glass bottles, and they are susceptible of fusion or volatilisation by strong heat.

Of the alkalies, the potassa, soda, and ammonia, only are used in pharmacy in an uncombined state.

The London College, adopting the alphabetical order of arrangement, first speak of the preparations of ammonia, then of potassa, and lastly of soda.

Preparations of Ammonia.

Ammoniæ subcarbonas. London, (formerly called ammonia præparata, and sal cornu cervi.)—Subcarbonate of ammonia.

Take of muriate of ammonia a pound, prepared chalk dried, one pound and a half. Let them be powdered separately, then mix them and sublime with a gradually increased heat until the retort become red hot.

Subcarbonas ammoniæ. Edinburgh.—Subcarbonate of ammonia.

Take of muriate of ammonia one part, the softer carbonate of lime, dried, two parts. Let them be separately pulverised, then mixed, and sublimed from a retort into a receiver kept cold.

In this formation a double decomposition takes place. The muriatic acid of the muriate of ammonia is attracted by the lime, and the carbonic acid by the ammonia. The subcarbonate of ammonia which is formed sublimes, while the muriate of lime remains in the retort.

Qualities.—The salt is commonly seen in a white, hard, semi-transparent mass. It is soluble in water, but when warm water is used it is in some measure decomposed. It is not soluble in alcohol. It is decomposed by the acids and alkalies as well as by their subcarbonates. Magnesia also partially decomposes it. The supertartrate of potassa, sulphate of magnesia, the metallic salts, and some of the earths, also decompose this salt. Its specific gravity is 0·966.

Medical properties.—Subcarbonate of ammonia is one of the most useful stimulants which the pharmacopœias afford. It may be administered in several cases, where, in consequence of the inflammatory diathesis which prevails, other excitants would be inadmissible; as in some instances of erysipelatous inflammation, febrile debility, and also in childrens' complaints, part of its virtues being dependent upon its power of neutralising acidity in the first passages. In atonic gout it is an excellent remedy, as it is in some forms of dyspepsia and hysteria. 'One part,' says Dr. Thomson, 'of pulverised subcarbonate of ammonia, and three parts of extract of belladonna spread on leather in the form of a plaster, is an excellent application for allaying rheumatic pains. Dose for internal administration from six grains to fifteen. It may be conveniently rubbed down with a scruple of aromatic confection.

Liquor ammoniæ. London.—Solution of ammonia.

Take of muriate of ammonia eight ounces, lime newly burnt six ounces, water four pints. Pour one pint of the water upon the lime; then cover the vessel and set it aside for an hour. Dissolve the muriate of ammonia in the remainder of the water previously heated; add to it the former mixture, and again cover the vessel; after the liquor has become cold strain it and distil twelve fluid ounces of solution of ammonia into a receiver whose temperature does not exceed 50°. The specific gravity of this solution is 0·960.

Aqua ammoniæ. Edinburgh.—Water of ammonia.

Take of muriate of ammonia one pound, lime newly burnt one pound and a half, distilled water one pound, water nine ounces. Upon the lime broken to pieces pour the water in an iron or earthen vessel, cover it up until the lime have fallen into powder and become cold; then rub the muriate to a fine powder, and triturate it with lime in a mortar, after which put them directly into a bottle glass retort. Place the retort in a sand-bath and adapt to it a receiver furnished with a tube passing into a phial containing the distilled water; the phial, however, being sufficiently large to hold double the quantity of water. Then apply the fire, gradually raising it until the bottom of the iron pot be red hot, and so long as gas and vapor are produced. The specific gravity of this solution is 0·939.

The muriate of ammonia in these processes is decomposed by the lime, this last having a greater affinity for the acid than has the ammonia; the ammonia is consequently disengaged and passes over, and the product is an aqueous solution of it.

Qualities.—Ammonia in this liquid form is a colorless fluid, very pungent in its odor, and having an extremely acid taste. It unites with all the acids and forms with them neutral salts. It soon becomes carbonated by mere exposure to the atmosphere. Acids and metallic salts and alum are incompatible with it in prescriptions. When it is at all carbonated the presence of the carbonic acid may be detected by adding to some of the solution muriate of lime, which will form a precipitate; if indeed it at all effervesce with

acids the presence of carbonic acid may be inferred.

Medical properties.—Stimulant, antacid, and rubefacient. Dose from ♏x to ♏xx. If taken as a poison and death does not immediately ensue considerable quantities of vinegar should be poured down the throat.

Aqua ammoniæ diluta. Edinburgh.—Distilled water of ammonia.

Take of water of ammonia one part, distilled water two parts. Mix them.

As extemporaneous dilution is always sufficiently easy, this preparation might have been dispensed with.

Liquor ammoniæ acetatis. London.—Solution of acetate of ammonia.

Take of subcarbonate of ammonia two ounces, diluted acetic acid four pints or a sufficient quantity. Add the acid to the subcarbonate of ammonia until the effervescence cease.

Aqua acetatis ammoniæ. Edinburgh.—Water of acetate of ammonia.

Take of carbonate of ammonia in powder any quantity, pour upon it so much weak acid as will exactly saturate the ammonia.

It is better, perhaps, that the saturation be made by guess and taste, and then tasted as in the Dublin College; for the distilled vinegar is always of varied strength.

Qualities.—This liquor is limpid and nearly without color. Strong acids and fixed alkalies decompose it, as do alum, magnesia, lime water, sulphate of magnesia, oxymuriate of mercury, and nitrate of silver, which are all of course incompatible with it in prescription. The sulphates of metals and acetate of lead are also decomposed by it.

Medical properties.—An exceedingly useful refrigerant and diaphoretic in disorders accompanied by much febrile heat. It is also diuretic, especially when taken while the patient is not in bed. It is useful as a cooling lotion to the head in cases of phrenitic affection, and Dr. Thomson tells us that he has employed it with the best effect, as a lotion in porrigo affecting the scalp. Dose from f. ʒiij to f. ℥j.

Liquor ammoniæ subcarbonatis. London.—Solution of subcarbonate of ammonia.

Take of subcarbonate of ammonia four ounces, distilled water a pint. Dissolve the subcarbonate of ammonia in water, and filter through paper.

Solutio subcarbonatis ammoniæ. Edinburgh.—Solution of subcarbonate of ammonia.

Take of subcarbonate of ammonia one part, distilled water four parts. Dissolve the subcarbonate in the water, and filter through paper.

Qualities.—Limpid and colorless; it forms a coagulum, when shaken with twice its bulk of alcohol.

Medical properties.—Stimulant and diaphoretic. Dose from ♏xxv. to f. ʒj. in any fluid that does not decompose it.

Preparations of Potassa.

Liquor potassæ. London.—Solution of potassa.

Take of subcarbonate of potassa a pound; lime fresh burnt half a pound; boiling distilled water a gallon. Dissolve the subcarbonate of potassa in two pints of the water. Add the remainder of the water to the lime; mix the hot liquors together; then set the mixture aside in a covered vessel; and, when it is cold, let it be strained through a cotton bag. If, on the addition of any diluted acid, effervescence be excited, more lime must be added, and the filtration repeated. A pint of this solution ought to weigh sixteen ounces.

Aqua potassæ. Edinburgh.—Water of potassa.

Take of lime fresh burnt eight ounces; subcarbonate of potassa six ounces; boiling water twenty-eight ounces. Let the lime be put into an iron or earthen vessel with twenty ounces of the water. When the ebullition ceases, immediately add the salt dissolved in the remaining eight ounces of the water; and, having thoroughly mixed the whole, cover the vessel till the mixture cool. The mixture being cooled, agitate it well, and pour it into a glass funnel, the tube of which is obstructed with a piece of clean linen. Cover the upper orifice of the funnel, while its tube is inserted into another glass vessel, that the solution of potassa may gradually drop through the linen of the lower vessel. When it first ceases to drop, pour a few ounces of water into the funnel; but cautiously, so that the fluid may swim above the matter. The water of potassa will again begin to drop. The affusion of water, however, must be repeated until three pounds have filtered, which will be in the space of two or three days; then let the upper part of the solution be mixed with the lower by agitation, and preserve it in a well stopped vessel.

In this separation the lime, attracting the carbonic acid of the subcarbonate of potassa, leaves the alkali in a state of purity, or causticity. The liquid should be kept in closely stopped bottles, otherwise it will become carbonated by exposure to the air.

Qualities.—Solution of potassa is exceedingly caustic, scarcely admitting of being put on the tongue. It is without color, and has an oily appearance when shaken. If muriates be present in it they may be detected by saturating a portion of the liquid with nitric acid, then adding nitrate of barytes to precipitate the sulphates if any; and lastly adding a solution of nitrate of silver, which is precipitated if any muriate be present. Sulphates are detected by saturating the liquor with muriatic acid, and adding muriate of barytes; and if lime be present blowing into a liquor through a tube, by adding carbonic acid, will render it turbid. It is always more or less impure, as ordered by the pharmacopœias, but not to the extent of interfering with its medicinal virtues. The specific gravity of the solution ought to be 1·056. It is a solvent of gum, extractive and resin, and it forms soap when mixed with oils or fat.

Medical properties.—Diuretic, antacid, and lithontriptic. Dr. Willan speaks highly of it in lepra; and Dr. Thomson says that it may be almost regarded as a specific in the various species of psoriasis which depend altogether upon acidity in the primæ viæ, and a hasty and consequently imperfect formation of the juices of the stomach.

Dose ♏x. to f. ʒj. or f. ʒij in some of the cutaneous affections.

Liquor potassæ subcarbonatis. London.—Solution of carbonate of potassa.

Take of subcarbonate of potassa a pound; distilled water twelve fluid ounces. Dissolve the subcarbonate of potassa in the water, and filter the solution through paper.

Qualities.—This solution ought to be quite clear, and without color or smell. It is of course incompatible in prescription with sulphate of magnesia and the metallic salts. It is likewise improper to mix with lime water, or magnesia, or substances containing much of the tannin principle.

Medical properties.—The same as the salt itself. Dose from ♏xv. to f. ʒij.

Potassa cum calce. London.—Potassa with lime. Take of solution of potassa three pints; lime fresh burnt a pound. Boil the solution of potassa down to a pint; then add the lime, previously slaked by the water, and intimately mix them.

Potassa cum calce. Olim, *Causticum commune mitius.* Edinburgh.—Potassa with lime; formerly, milder common caustic.

Take of the water of potassa any quantity. Evaporate it to one-third part in a covered iron vessel; then mix with it as much newly slaked lime as will bring it to the consistence of a solid paste, which is to be preserved in a well stopped vessel. The lime makes the alkali less deliquescent, and consequently more manageable as an escharotic.

Potassa fusa. London.—Fused potassa.

Take of solution of potassa a gallon. Evaporate the water in a clean iron vessel over the fire until, the ebullition having ceased, the potassa melts; then pour it out upon a clean iron plate into pieces of proper form.

Potassa. Olim. *Causticum commune acerrimum.* Edinburgh.—Potassa; formerly stronger common caustic.

Take of solution of potassa any quantity. Evaporate it in a covered very clean iron vessel until, the ebullition being over, the saline matter flows smoothly like oil, which happens before the vessel becomes red hot. Then pour it out upon a clean iron plate, cut it into small masses before it hardens, and let it be preserved in well stopped phials.

'The concrete potassa procured by these processes is a hydrate sufficiently pure for medical purposes; but it still contains the same foreign ingredients as the solution. To procure it as free as possible from carbonic acid, the evaporation should be performed in a silver vessel very quickly; the vessel should be deep, so that the watery vapor which arises may exclude the atmospheric air. It is generally run into moulds, and formed into solid cylinders, which are covered with paper, and kept in well stopped bottles. The method of Berthollet for obtaining it in perfect purity, which is usually described in chemical and pharmaceutical works, is too troublesome and expensive to be generally adopted. The following method, proposed by Lowitz, is more economical:—

A solution of potassa must be evaporated till a pellicle forms on its surface, then allowed to cool; and the saline deposit, which consists chiefly of the foreign salts, carefully separated. The evaporation is then to be renewed, skimming off the pellicles that form on the surface of the fluid, which, as soon as these cease to be produced, and the ebullition is ended, must be removed from the fire, and constantly stirred till it is cold. The mass is next to be dissolved in twice its weight of distilled cold water, the solution filtered and evaporated in a clean iron or silver basin until crystals are deposited. If the heated fluid consolidate into a mass in any degree, a small portion of water must be added, and the mass again heated to fluidity. The supernatant liquor is left of a brown color, which, after being kept for some time at rest in well-stopped phials, deposits the coloring matter, and may again be evaporated and crystallised as before. The crystals obtained in the various evaporations are colorless, pure potassa.'—Thomson.

Qualities.—When made properly, potassa is in the form of a white brittle substance, smelling like quicklime when being slaked, and too caustic to be tasted. It is soluble in water and alcohol, and attracts humidity from the air. It is fused and volatilised by heat; and it combines with sulphur, the fixed oils, and the metallic oxides.

Medical properties.—Escharotic. Employed usefully in strictures requiring caustic.

Potassæ acetas. London.—Acetate of potassa.

Take of subcarbonate of potassa a pound and a half; of the stronger acetic acid two pints; boiling distilled water two pints. Mix the acid with the water, and pour it upon the subcarbonate of potassa till all ebullition cease, after which filter. First evaporate the solution in a water-bath until no more bubbles rise; then expose it to gradually increased heat, and continue the evaporation till a pellicle form, which should be removed and dried on blotting paper. Repeat the evaporation again and again, removing the pellicles as they form, and drying them in the manner already described.

Acetas potassæ. Edinburgh.—Acetate of potassa.

Take of very pure carbonate of potassa one pound; weak acetic acid a sufficient quantity. Boil the subcarbonate in five pounds of the acid, and add more acid at different times, until, the watery part of the former portion being nearly dissipated by evaporation, the acid newly added occasions no effervescence, which will be the case when about twenty pounds of it have been consumed; then evaporate slowly to dryness. Liquefy this impure salt with a gentle heat for a short time; then dissolve it in water, and filter through paper. If the liquefaction have been properly performed, the filtered fluid will be limpid, but otherwise of a brown color. Afterwards evaporate this fluid in a shallow glass vessel, so that, when removed from the fire, it may pass into a crystalline mass. Finally, the acetate of potassa ought to be preserved in closely shut vessels.

Qualities.—This salt possesses a peculiar odor and a sharp taste. It is deliquescent, and it changes into a subcarbonate by exposure to a red heat. It is soluble in water and alcohol.

When adulterated with tartrate of potassa a precipitate will be occasioned by the addition of tartaric acid in solution; and acetate of lead will produce a precipitate soluble in acetic acid, sulphates may be diluted by nitrate of barytes, and muriates by nitrate of silver.

Medical properties.—Aperient and diuretic. Principally employed in dropsical affections. Dose as an aperient two or three drachms—as a diuretic, from half a drachm to a drachm often repeated.

Potassæ carbonas. London.—Carbonate of potassa.

Take of the solution of subcarbonate of potassa a gallon. By means of a proper apparatus transmit carbonic acid through the solution until it is saturated. Then filter. Evaporate until crystals form, being careful not to increase the heat above 120°, separate the crystals from the fluid and dry them on blotting paper.

Carbonic acid is easily obtained from white marble and diluted sulphuric acid.

Carbonas potassæ. Edinburgh.—Carbonate of potassa.

Take of pure carbonate of potassa two parts, water three parts. Dissolve the salt in the water, and by means of a proper apparatus throw into it a stream of carbonic acid gas. Filter the solution when it ceases to absorb the acid, and then evaporate it by a heat not exceeding 180°, that crystals may form.

The carbonic acid is easily obtained by pouring diluted sulphuric acid on pulverised carbonate of lime.

It has been recommended by some that muriatic acid be used to evolve the carbonic acid from the marble.

Qualities.—'This salt, prepared by these formulæ, is, properly speaking, a bicarbonate; the subcarbonate of the pharmacopœias being really a carbonate.' It is without odor, has a taste slightly alkalescent, and mild. It is not soluble in alcohol. It is incompatible in prescriptions with the acidulous salts, with the metallic salts, with borax, muriate of ammonia, lime water, sulphate of magnesia, and alum.

Medical properties.—Useful in the preparation of the effervescing draught. Dose of the salt from ℈ß to ʒj.

Potassæ subcarbonas. London.—Subcarbonate of potassa.

Take of impure potassa (pearl ashes), reduced to a powder, three pounds, boiling water three pints and a half. Dissolve the potassa in the water and filter; then pour the solution into a clean iron pot and evaporate with a gentle heat until the liquor thicken; lastly, being taken from the fire, stir assiduously with an iron spatula until the salt concrete in small grains.

A purer subcarbonate of potassa may be prepared in a similar manner from tartar, previously burnt until it be of an ash color.

Subcarbonas potassæ. Edinburgh.—Subcarbonate of potassa.

Let impure carbonate of potassa be put into a crucible and exposed to a red heat. Then triturate it with an equal weight of water. Pour the solution after the impurities have subsided into a clean iron pot, and boil it to dryness; stirring the salt constantly towards the end of the boiling, to prevent it from adhering to the vessel.

This salt, as above intimated, is rather a carbonate than a subcarbonate, 'being composed of one atom of each of its components.' See CHEMISTRY.

Subcarbonas potassæ purissimus. Edinburgh.—Pure subcarbonate of potassa.

Take of impure supertartrate of potassa any quantity, wrap it up in moist bibulous paper, or put it into a crucible; and, having placed it among live coals, let it be burnt to a black mass; which, after having reduced it to powder, expose in an open crucible to a moderate fire, until it become white, or at least ash-colored, taking care that it be not melted. Then dissolve it in warm water; strain the solution through a linen cloth, and evaporate it in a clean iron vessel, stirring constantly towards the end of the process with an iron spoon, lest any of it should adhere to the bottom of the vessel. A very white salt will remain, which is to be left a little longer on the fire till the bottom of the vessel become red hot. Finally, when it is cold let it be preserved in well-stopped glass vessels.

Qualities.—The same as those obtained from the potassa of commerce, with fewer impurities. The impurities of this salt we are directed to ascertain in the following manner:—'If one part of it be dissolved in eight parts of distilled water, and saturated with pure nitric acid, the presence of siliceous earth will be indicated by the solution becoming turbid, and, by weighing the precipitate, its quantity may be ascertained. A precipitate being formed on the addition of muriate of barytes indicates the presence of the sulphates; a white precipitate turning bluish on exposure to the light, on adding nitrate of silver, proves the presence of muriatic salts; and calcareous earth is rendered evident by dropping into a solution of the subcarbonate a few drops of a solution of oxalic acid or oxalate of ammonia.'

Medical properties.—Antacid and diuretic; principally employed in the composition of the saline draught, in the proportion of a scruple to a table spoonful of lemon juice, or fifteen grains of the concrete tartaric acid.

Potassæ sulphas. London.—Sulphate of potassa.

Take of the salt which remains after the distillation of the nitric acid two pounds, boiling water two gallons. Mix them so as to dissolve the salt, and then add as much subcarbonate of potassa as may be sufficient to saturate the acid. Next boil till a pellicle be formed on the surface, and after filtering the liquor set it aside to crystallise. Pour off the water, and dry the crystals on bibulous paper.

Sulphas potassæ. Edinburgh.—Sulphate of potassa.

Dissolve the acidulous salt which remains after the distillation of the nitrous acid in hot water, and add so much carbonate of lime in powder as will saturate the superfluous acid, and leave the whole at rest until the fæces subside. Having poured off the fluid filter it through paper, and evaporate until crystals form.

Dr. Thomson prefers the Edinburgh process as being quite equal to the others with less expense.

Qualities.—The taste is nauseous and rather bitter. The crystals decrepitate when heated, but they are not efflorescent. They are soluble to a certain extent in water. The nitric, muriatic, and tartaric acids partially decompose it: its solution is also incompatible in prescription with muriate of barytes, muriate of lime, oxymuriate of mercury, nitrate of silver, and acetate of lead.

Medical properties.—Cathartic and deobstruent. It is often combined with rhubarb and given in the form of powder, on account of its being less soluble and deliquescent than some other of the saline purgatives. Some practitioners, as Dr. Yeats, have much lauded it in complaints of children. Dr. Y. recommends it to be very finely powdered. Dose for an adult from 15 grs. to ʒj.

Potassæ supersulphas. London.—Supersulphate of potassa.

Take of the salt which remains after the distillation of the nitric acid two pounds, boiling water four pints. Mix them so that the salt may be dissolved, and filter. Then let the solution be boiled till one half is evaporated, and let it be set aside to crystallise. Pour off the water, and let the crystals be dried on bibulous paper.

Qualities.—The crystals are acid and bitterish, soluble in water, and reducible to simple sulphate of potassa by exposure to a red heat.

Medical properties.—It has been introduced into the pharmacopœia from an idea that it will afford a useful means of producing the sulphuric acid in combination with an aperient salt. Dose 10 grs. to ʒij.

Sulphas potassæ cum sulphure. Edinburgh.—Sulphate of potassa with sulphur.

Take of nitrate of potassa in powder, and of sublimed sulphur equal weights. Mix them well together, and throw the mixture in small quantities at a time into a red hot crucible. The deflagration being finished, let the salt cool, and preserve it in a well-stopped glass vessel.

This preparation was originally known under the name of sal polychrest. In the process of making it both sulphuric and sulphurous acids are formed from the sulphur, but the oxygen which is evolved by the heat is not sufficient to acidify all the sulphur employed, so that part of the latter goes into combination with the potassa of the nitre as sulphur. Thus, sulphate and supersulphate of potassa are formed together with a sulphuret of the same.

Qualities.—The salt tastes acid, and reddens an infusion of litmus. It is soluble in water, and by exposure to air converted into sulphate of potassa.

Medical properties.—Cathartic, like the sulphate of potassa, by which last it is almost superseded.

Potassæ tartras. London.—Tartrate of potassa.

Take of subcarbonate of potassa sixteen ounces, supertartrate of potassa three pounds, boiling water a gallon. Dissolve the subcarbonate of potassa in the water, and add the supertartrate of potassa reduced to powder, till the effervescence cease. Filter the solution through paper; then boil it until a pellicle appear on the surface, and set it aside to crystallise. The water being poured off from the crystals let them be dried on bibulous paper.

Tartras potassæ. Edinburgh.—Tartrate of potassa:

Take of subcarbonate of potassa one part, supertartrate of potassa three parts, or a sufficient quantity, boiling water fifteen parts. To the subcarbonate dissolved in the water add in small portions the supertartrate of potassa reduced to fine powder so long as it excites effervescence; which gradually ceases before three times the weight of the subcarbonate of potassa be added. Let the solution when it is cool be filtered, evaporated, and set aside to form crystals.

Qualities.—This salt is bitterish to the taste; it is soluble in water, and deliquescent. The weaker acids partially decompose it; and lime water, magnesia, muriate of barytes, nitrate of silver, and acetate of lead completely.

Medical properties.—A useful purgative, operating without griping. Dose from f. ʒij. to f. ℥j.

Aqua supercarbonatis potassæ. Edinburgh.—Water of supercarbonate of potassa.

Take of water ten pounds, pure subcarbonate of potassa one ounce. Dissolve and expose the solution to a current of carbonic acid gas, arising from carbonate of lime in powder three ounces, sulphuric acid three ounces, and water three pounds, gradually and cautiously mixed. The chemical apparatus of Dr. Nooth is well suited for this preparation. But, if a large quantity of the solution be wanted, an apparatus which will admit of a sufficiently great pressure should be employed. The solution must be preserved in well stopped vessels.

Qualities.—Taste pungent and acidulous, violently effervescing with all acids.

Medical properties.—Antacid, diuretic, and lithontriptic. It is better for the saline draught in effervescence, than that prepared with the carbonate. Dose in calculous disorders f. ℥viij. two or three times a day.

Preparations of Soda.

Sodæ carbonas. London.—Carbonate of soda.

Take of subcarbonate of soda a pound, distilled water three pints. Dissolve the subcarbonate of soda in the distilled water. Then let carbonic acid be transmitted through the solution by means of a proper apparatus until it be saturated, and set it apart to crystallise. Dry the crystals by compressing them in blotting paper. Let the remainder of the solution be evaporated by a heat not exceeding 120°, in order that more crystals may be procured. These are to be compressed and dried in the same manner as before.

Carbonas sodæ. Edinburgh.—Carbonate of soda.

Take of subcarbonate of soda two parts, water three parts. Dissolve the salt in the water and subject it to a stream of carbonic acid gas, until the acid be no longer absorbed. Then let the fluid be filtered and evaporated in a heat not exceeding 18°, so that crystals may form. The carbonic acid is easily obtained from equal weights

of pulverised carbonate of lime and of sulphuric acid largely diluted with water.

This is a bicarbonate. Dose from 15 grs. to ℈ij.

Phosphas sodæ. Edinburgh.—Phosphate of soda.

Take of bones burnt to whiteness and reduced to powder ten pounds, sulphuric acid six pounds, subcarbonate of soda a sufficient quantity. Let the powdered bones be mixed with the sulphuric acid in an earthen vessel; then add nine pounds of water, and mix again; keep the vessel in a vapor bath for three days; after which dilute the matter with nine pounds more of boiling water, and strain through a strong linen cloth, pouring boiling water gradually over it until the whole of the phosphoric acid be washed out. Set the strained liquor apart that the impurities may subside, from which pour it off, and evaporate to nine pounds. To this liquor, separated from its impurities and heated in an earthen vessel, add a warm solution of subcarbonate of soda until the effervescence cease. Then strain, and set the liquor aside for the formation of crystals. These being removed add to the liquor, if necessary, a little subcarbonate of soda, that the phosphoric acid may be accurately saturated; and dispose it by evaporation again to yield crystals so long as these shall be produced. Finally let the crystals be kept in a well closed vessel.

Qualities.—This salt resembles in taste the common culinary salt. It effloresces on exposure to the air, is soluble, and undergoes the watery effusion when exposed to a sufficient heat. Muriate of lime, barytes, and magnesia, decompose it, and the strong acids convert it into a biphosphate.

Medical properties.—A mild and gentle cathartic. Dose from ʒvj. to ℥iß.

Sodæ subcarbonas. London.—Subcarbonate of soda.

Take of impure soda (barilla) in powder a pound, boiling distilled water four pints. Boil the soda in the water for half an hour, and filter the solution. Evaporate it to two pints and set it apart that crystals may form. Throw away the remaining liquor.

Subcarbonas sodæ. Edinburgh.—Subcarbonate of soda.

Take of impure carbonate of soda any quantity. Bruise it, and then boil it in water until all the saline matter be dissolved. Filter the solution through paper, and evaporate it in an iron vessel, so that when cold crystals may form.

Qualities.—Taste mildly alkalescent. It is soluble in water, and fusible at 150° of Fahrenheit. For detecting impurities use the methods described under subcarbonate of potassa. If tartaric acid be added to the solution of the subcarbonate of soda, and potassa be present, this matter will form a precipitate of supertartrate.

Medical properties.—Antacid, lithontriptic, and deobstruent. Dose from ℈ß. to ʒj.

Sodæ subcarbonas exsiccata. London.—Dried subcarbonate of soda.

Take of subcarbonate of soda a pound, expose it to a boiling heat in a clean iron vessel until it become perfectly dry, and stir it at the same time diligently with an iron spatula. Lastly rub it into a powder.

Medical properties.—The same as the subcarbonate but stronger, being deprived of the water of crystallisation; on this account also it is much fitter to form into pills.

Sodæ sulphas. London.—Sulphate of soda.

Take of the salt which remains after the distillation of muriatic acid two pounds, boiling water two pints and a half. Dissolve the salt in the water; then gradually add so much carbonate of soda as will saturate the acid. Boil the solution until a pellicle appear; and, after having filtered it, set it apart to crystallise. Pour the water off from the crystals, and dry them on bibulous paper.

Sulphas sodæ. Edinburgh.—Sulphate of soda.

Dissolve in water the acidulous salt which remains after the distillation of muriatic acid; and having mixed chalk with it in powder, to remove the superfluous acid, set it apart until the subsidence of the impurities. Then, having poured off the liquor, filter it through paper, and reduce it by evaporation, so as to form crystals.

Qualities.—This salt is bitter as well as saline to the taste. It is soluble in water, and effloresces when exposed to the air. It also undergoes watery fusion when exposed to a sufficient heat.

Medical properties.—Purgative. Not so much used as formerly, on account of its bitter taste. Dose from ℥j to ℥ij.

Aqua supercarbonatis sodæ. Edinburgh.—Water of supercarbonate of soda.

Take of water ten pounds, subcarbonate of soda two ounces. Dissolve and subject the solution to a stream of carbonic acid gas, procured from three ounces of carbonate of lime, and the same quantity of sulphuric acid, with three pounds of water, gradually and cautiously mixed together. It may be prepared conveniently in Nooth's apparatus. But, if a large quantity of it be required, an apparatus will be requisite that is capable of affording a greater pressure. The fluid must be preserved in well corked bottles.

Soda tartarizata. London.—Tartarised soda.

Take of subcarbonate of soda twenty ounces, supertartrate of potassa powdered two pounds, boiling water ten pints. Dissolve the subcarbonate of soda in the water, and add gradually the supertartrate of potassa. Filter the solution through paper, then boil it till a pellicle forms on the surface, and set it aside to crystallise. Pour the water away from the crystals, and dry them on bibulous paper.

Tartras sodæ et potassæ. Edinburgh.—Tartrate of soda and potassa.

Take of subcarbonate of soda one part, supertartrate of potassa three parts, or a sufficient quantity, boiling water fifteen parts. To the subcarbonate, dissolved in the water gradually, add the supertartrate rubbed to a fine powder, so long as effervescence may be excited, which generally occurs before three times the weight of the subcarbonate is added; when the fluid is cold filter it through paper, and after a proper degree of evaporation set it aside that crystals may form.

This is a triple salt, formed by the saturation of the superabundant acid of the supertartrate by the soda of the subcarbonate, the dissipation of the carbonic acid from the latter, and the union of the two alkaline bases.

Qualities.—Saline and bitter. Soluble, and slightly effervescent. It is decomposed by a nigh heat and strong acids, and muriates of lime and barytes.

Medical properties.—A mild cathartic, and slightly diuretic. Dose ℨvj. to ℥iß.

EARTHS AND EARTHY SALTS.

The earths are, as it has been stated in the article CHEMISTRY, metallic oxides: some of them being alkalescent, and some not. Of the former, lime, magnesia, and barytes, are those employed medicinally, the last indeed only in combination. Of the earths that do not possess alkaline properties one only is introduced into medicine, viz. alumina, and this, like barytes, is only used when combined; for alum itself is a sulphate. See CHEMISTRY.

PREPARATIONS OF ALUMINA.

Alumen exsiccatum. London.—Dried alum.

Melt the alum in an earthen vessel over the fire, and let the heat be increased till the ebullition ceases.

Edinburgh.—Melt the alum in an earthen or iron vessel, and keep it over the fire until the boiling ceases: then let it be rubbed into a powder.

In this process the water of crystallisation is expelled, and the aluminous principle of course more concentrated; but if the heat be too great, or not sufficiently gradual, its sulphuric acid is partly expelled and decomposed.

Liquor aluminis compositus. London.—Compound solution of alum.

Take of alum and sulphate of zinc each half an ounce, boiling water two pints. Let the alum and the sulphate of zinc be boiled in water, and then filtered through paper.

'Half an ounce of this solution, and six ounces and a half of rose water, form an excellent collyrium in ophthalmia, after local bleeding.'

PREPARATIONS OF LIME.

Calx. London.—Lime.

Take of white marble a pound; break it into small pieces, and expose these in a crucible to a very strong fire during an hour, or until the carbonic acid be so thoroughly expelled that no air bubbles will be extricated on the addition of acetic acid.

Calx e testis. London.—Lime from shells.

In the same manner lime is also prepared from shells.

In order to obtain lime quite pure, these processes are not sufficient. See CHEMISTRY, article *Lime.*

Liquor calcis. London.—Lime water.

Take of lime half a pound, boiling distilled water twelve pints. Pour the water upon the lime, and let them be agitated together; cover the vessel directly, and set it apart three hours. The solution must be preserved over the undissolved portion of the lime in well stopped glass bottles, and the clear fluid poured off when it is wanted for use.

Solutio calcis, sive aqua calcis. Edinburgh.—Solution of lime, or lime water.

Take of lime fresh burnt half a pound. Put it into an earthen vessel, and sprinkle upon it four ounces of water, keeping the vessel covered until the lime become hot and fall into powder; then let twelve pounds more of water be poured on it, and mix, by agitation, the water with the lime. After the lime shall have subsided, let the agitation be repeated; and do this about ten times, the vessel being kept shut in order to prevent the access of air. Lastly, let the water be filtered through paper, interposing glass rods between the paper and the funnel, that the water may pass through as quickly as possible. The solution is to be preserved in well stopped bottles.

The mode of the London college is preferred by Dr. Thomson.

Qualities.—Lime water is without smell or color; its taste is styptic. It speedily attracts carbonic acid from the air, and therefore requires to be kept in well stopped bottles.

Medical properties.—Antacid and anthelmintic. Dose from f. ℥ß. to Oß. It is generally best to give it combined with an equal quantity of milk.

Murias calcis. London.—Muriate of lime.

Take of the salt which remains after the sublimation of the subcarbonate of ammonia two pounds; water a pint. Mix them, and let the solution be filtered through paper; then evaporate it till the salt becomes dry. The salt is to be preserved in well stopped bottles.

'This preparation is a chloride of calcium. Muriate of lime can only exist in a state of solution in water; and, in evaporating to dryness, the muriatic acid is decomposed and resolved into chlorine and hydrogen; while at the same time the oxide of calcium, forming part of the muriate, parts with its oxygen; the chlorine attaches itself to the calcium, forming a chloride of calcium, which is obtained as a dry salt; and the oxygen to the hydrogen, forming water, which is evaporated.'—Thomson.

Qualities.—A pungent bitter salt, inodorous, soluble in water and alcohol, producing cold during solution.

Medical properties.—Proposed by some in scrofulous disorders but very little used. Dose from gr. j. to grs. iv.

Liquor muriatis calcis. London.—Solution of muriate of lime.

Take of muriate of lime two ounces; distilled water three fluid ounces. Dissolve the muriate of lime in the water, and let the solution be filtered through paper.

Solutio muriatis calcis. Edinburgh.—Solution of muriate of lime.

Take of the harder variety of carbonate of lime (white marble), broken into small pieces, nine ounces; muriatic acid sixteen ounces; water eight ounces. Mix the acid with the water, and gradually add the pieces of carbonate of lime. The effervescence being finished, digest for an hour. Pour off the fluid, and reduce it, by evaporation, to dryness. Let the residue be dissolved in its weight and a half of water, and the solution be filtered.

The chemistry of the preparation ordered by the Edinburgh College is sufficiently obvious. In the solution ordered by the London College, of the chloride of calcium, an actual muriate of

lime is formed by the decomposition of the water.

Qualities.—Taste pungent and bitter. Decomposible by the sulphuric, nitric, phosphoric, fluoric, and boracic acids, and by their neutral salts, as well as by the alkalies.

Medical properties.—Recommended by some in scrofulous and glandular affections. Dose from ♏xx. to f. ʒj.

Creta præparata. London.—Prepared chalk.

Take of chalk a pound; add a little water to it, and triturate to a fine powder. Throw this into a large vessel of water; stir it; and, after a short time, pour off the supernatant turbid water into another vessel, and let it be set apart that the powder may subside; finally, let the water be poured off and the powder dried.

Carbonas calcis præparatus. Edinburgh.—Prepared carbonate of lime.

Let carbonate of lime, rubbed to a powder in an iron mortar, and levigated with a little water on a porphyry stone, be put into a large vessel; then pour water upon it, which, after frequently shaking the vessel, is to be decanted off, laden with the fine powder. The subtile powder which subsides when the water remains at rest is to be dried. Let the coarse powder which could not be suspended in the water be again levigated, and treated in the same manner.

Qualities.—Very white, soft, and light. It is a pure carbonate of lime.

Medical properties.—Antacid, and absorbent. Dose from grs xv. to ℈ij. or ʒj.

Murias barytæ. Edinburgh.—Muriate of barytes.

Take of carbonate of barytes, and muriatic acid, of each one part; water three parts. To the water and the acid, mixed together, let the carbonate of barytes be added, broken into small pieces. The effervescence being finished, digest for an hour; then filter, and, after due evaporation, let the solution be set apart for the formation of crystals. Repeat the evaporation so long as any crystals are formed.

The college order a muriate of barytes to be prepared from the sulphate by a more complicated process; but we do not give the process, for the first is sufficient, and the carbonate is a mineral which can always be procured. The muriate of barytes is, more strictly speaking, a chloride of barium.

Qualities.—Muriate of barytes (chloride of barium) is disagreeable and bitter to the taste. It is soluble in water, but not in alcohol. It decrepitates and ultimately melts by heat. It is only employed in the following solution:—

Solutio muriatis barytæ. Edinburgh.—Solution of muriate of barytes.

Take of muriate of barytes one part; distilled water three parts. Dissolve.

Qualities.—Limpid, and without color. Decomposible by the sulphates and nitrates of the earths and metals.

Medical properties.—Stimulant, and deobstruent. It has been employed both in scrofula and syphilis, but it is not at present much thought of. Dose from ♏v. to xx. or more very gradually increased.

Magnesia. London.—Magnesia.

Take of subcarbonate of magnesia four ounces. Burn it in a very strong fire for two hours, or until no effervescence be excited by the dropping of acetic acid into it.

Edinburgh.—Let carbonate of magnesia be subjected to a strong heat in a crucible for two hours, after which keep it in closely stopped bottles.

The heat dissipates the carbonic acid, and leaves the magnesia pure.

Qualities.—White and very soft powder. Not fusible, and requiring for solution an exceedingly large proportion of water.

Medical properties.—See under *subcarbonate of magnesia.*

Magnesiæ subcarbonas. London.—Subcarbonate of magnesia.

Take of sulphate of magnesia a pound; subcarbonate of potassa nine ounces; water three gallons. Let the subcarbonate of potassa be dissolved in three pints of water, and the sulphate of magnesia in five pints, and filter; then let the rest of the water be added to the solution of sulphate of magnesia, and boil it, adding to it, while boiling, the solution of the subcarbonate of potassa, with constant stirring. Strain through linen, and lastly let the powder be repeatedly washed with boiling water, and dried upon bibulous paper, with a heat of 200°.

Carbonas magnesiæ. Edinburgh.—Carbonate of magnesia.

Take of sulphate of magnesia four parts; subcarbonate of potassa three parts; boiling water a sufficient quantity. Dissolve the salts separately in twice their weight of water, and strain, or otherwise free from impurities; then mix them, and immediately add eight times their weight of boiling water. Boil the liquor for a short time, stirring it; then let it continue at rest till the heat be a little diminished, and strained through linen, upon which the carbonate of magnesia will remain. This, after being well washed with pure water, is to be dried with a gentle heat.

In these processes there is obviously a double decomposition; the sulphuric acid leaves the magnesia to unite with the potassa, while the consequently disengaged carbonic acid of the latter attaches itself to the magnesia.

Qualities.—Inodorous, perfectly white, and without much taste; it is exceedingly smooth to the touch, and nearly insoluble in water. It is decomposed by the acids, the alkalies, and neutral salts. A strong heat will also dissipate its carbonic acid, as shown in the preparation of burning magnesia.

Medical properties.—An excellent antacid, stomachic, aperient, and lithontriptic. Only, however, aperient when it encounters an acid in the stomach, so as to form a neutral salt. Dose from grs. xv. to ʒiss. or more.

METALLIC PREPARATIONS.

For an account of the properties and habits of metals see CHEMISTRY. The metals which are employed in medicine are antimony, arsenic, bismuth, copper, iron, lead, mercury, silver, tin, zinc. Mercury and tin are used in their metallic state, but not very commonly. Most of

the medicinal articles from this class of bodies are combinations with different mixtures of oxygen, or of acid. Some of sulphur, and other substances.

Preparations of Antimony.

Sulphuretum antimonii præparatum. Edinburgh.—Prepared sulphuret of antimony.

Put sulphuret of antimony, rubbed to powder, in an iron mortar, and levigated on a porphyry stone, with a small quantity of water, into a large vessel; then pour water on it, and, after having frequently agitated the vessel, pour it off laden with the fine powder.

The coarse powder, which the water is not able to suspend, is to be levigated again, and again treated in the same manner.

Qualities.—This powder is of a leaden gray color, is without much smell or taste, and is not soluble in water.

Medical properties.—Alterative. Not very much employed. Dose from grs. v. to ℈j.

Antimonii sulphuretum præcipitatum. London.—Precipitated sulphuret of antimony.

Take of sulphuret of antimony, in powder, two pounds; solution of potassa four pints; distilled water three pints. Mix them, and let the mixture be boiled over a gentle fire for three hours, assiduously stirring it, and occasionally adding distilled water, so as to keep up the same measure. Strain the solution through a double linen cloth directly, and, while it is still hot, drop in gradually so much sulphuric acid as may be necessary to precipitate the powder. Then wash away the sulphate of potassa with hot water, dry the precipitated sulphuret of antimony, and rub it to a fine powder.

Sulphuretum antimonii præparatum. Edinburgh.—Precipitated sulphuret of antimony.

Take of solution of potassa four parts; water three parts; prepared sulphuret of antimony two parts; diluted sulphuric acid a sufficient quantity. Mix the sulphuret with the solution of potassa and the water; then boil them in a covered iron pot over a gentle fire during three hours, frequently stirring with an iron spatula, and adding water as it may be requisite. Let the hot liquor be strained through a double linen cloth; and, when strained, let there be added to it so much sulphuric acid as may be necessary to precipitate the sulphuret, which must be well washed with warm water.

The product of these processes is a sulphureted hydrosulphuret of oxide of antimony. The following is given as the theory of its formation: 'During the boiling the potassa combines with the sulphur of the sulphuret of antimony, and forms sulphuret of potassa, which, decomposing part of the water, and attracting its disengaged hydrogen, is partly converted into a sulphureted hydrosulphuret of potassa, while its oxygen, aided by the sulphuretted hydrogen, oxidizes the antimony, which is dissolved by the sulphuretted hydrosulphuret of potassa. The sulphuric acid which is now added to the strained solution while it is hot, and which in part contains potassa, oxide of antimony, sulphur, and hydrogen, combines with the potassa, disengaging sulphureted hydrogen gas, and the oxide of antimony is precipitated, combined with the disengaged sulphur, and the remaining sulphureted hydrogen.'

Qualities.—This precipitate is of an orange color; it is without odor, is slightly styptic in taste, and is insoluble. When pure it does not effervesce with acid, so that if adulterated with chalk it may be easily tested.

Medical properties.—Alterative, diaphoretic, and slighly expectorant. Not so much employed as formerly. Dose from gr. i. to grs. iv.

Antimonium tartarizatum. London.—Tartarised antimony.

Take of glass of antimony (see Chemistry) finely powdered, supertartrate of potassa in powder, of each one pound; boiling distilled water one gallon. Mix the glass of antimony and the supertartrate of potassa. and add them gradually to the boiling distilled water, constantly stirring the mixture with a spatula; then boil for a quarter of an hour, and set it aside. When the solution is cold let it be filtered, and evaporate so as to form crystals.

Tartras antimonii. Edinburgh. Olim, *Tartras emeticus.*—Tartrate of antimony: formerly, tartar emetic.

Take of sulphuret of antimony, and nitrate of potassa, of each an equal weight; supertartrate of potassa a sufficient quantity. Filtrate separately the sulphuret and nitre; and, having well mixed them together, throw them into a red hot crucible. When the deflagration is over, let the red matter be separated from the white crust, and rubbed down to a very fine powder, which must be washed with several effusions of warm water, and subsequently dried.

This powder is now to be rubbed together with an equal weight of supertartrate of potassa, and the mixture boiled in a glass vessel with four times its weight of distilled water during an hour; then strained through paper, and the strained solution set aside in order that crystals may form by evaporation.

In the process of the London College the excess of acid in the supertartrate of potassa acts upon the glass of antimony in such a manner as to leave its sulphur untouched; the tartrate which remains is held in solution with the antimonial tartrate; thence the product is a double salt, the tartrate of potassa and antimony; the same salt is also formed in the other process by the superabundant acid of the supertartrate of potassa combining with antimonial oxides. 'Tartrate of antimony and potassa,' says Dr. Thomson, 'ought, on the principles of the reformed nomenclature, to be the name of this salt;' and he very properly regrets that 'all the colleges have not concurred in adopting the same preparation of antimony for the formation of this important salt.'

Qualities.—Tartar emetic is white, without smell, and has a slightly metallic taste. It is soluble in water; but when kept in solution long is spontaneously decomposed. It is often, we are told, adulterated with supertartrate of potassa and tartrate of lime. When the former is the case it is precipitated from its aqueous solution by the addition of spirit. If the crystals deliquesce its purity is to be suspected. 'It is decomposed by heat, the strong acids, the alka-

nes, and alkaline carbonates, the earths, hydrosulphurets, some of the metals and their oxides, lime-water, muriate of lime, and acetate of lead, and by the decoctions or infusions of many bitter and astringent vegetables, as those of cinchona bark, rhubarb, galls and catechu; with which therefore it ought never to be conjoined in prescriptions.'' We think, however, in the face of this chemical objection to the combination of bark and antimony, that we have seen the union attended with advantage in some cases where both remedies have been simultaneously indicated.

Medical properties.—Emetic, sudorific, diaphoretic, and alterative, according to the dose in which it is given. It is one of the very best preparations of antimony, and may, by a due apportionment of dose to the circumstances of the case, be made almost to supersede the other preparations of antimony. Indeed the facility by which it may be minutely divided constitutes one of its advantages. Dose, as an emetic, from one to two grains, as a diaphoretic one-sixth or eighth of a grain. The continental physicians, especially the Italians, administer it in doses of from four to twelve grains in violent inflammations.

Vinum antimonii tartarizati. London.—Solution of tartarised antimony.

Take of tartarised antimony a scruple, boiling distilled water eight fluid ounces, rectified spirit two fluid ounces. Dissolve the tartarised antimony in the boiling distilled water; then let the spirit be added to the filtered solution.

Vinum tartratis antimonii. Edinburgh.—Wine of tartrate of antimony.

Take of tartrate of antimony twenty-four grains, Spanish white wine one pound. Mix, and dissolve the tartrate of antimony.

Wine is not a good menstruum for dividing the tartrate of antimony, as it occasions a slow decomposition of it, occasioning it is said a precipitate of oxide of antimony with a portion of supertartrate of potassa. Dr. Paris remarks 'that, when good sherry wine is employed, no decomposition of the salt takes place; and, if any precipitate occurs, it is tartrate of lime, arising from an accidental impurity in the bitartrate of potassa in the preparation.'

Medical properties.—The same as the salt. Dose ♏ xv. to f. ʒi. From ʒij. to ℥ß as an emetic.

Pulvis antimonialis. London.—Antimonial powder.

Take of sulphuret of antimony in powder a pound, hartshorn shavings two pounds. Mix, and throw them into a broad iron pot that has been heated to whiteness, assiduously stirring till vapors cease to rise. Let what remains be rubbed to powder; and, having put it into a proper crucible, expose it to a fire which is to be gradually raised so as that a white heat be kept up for two hours. Let the residue be rubbed down into very fine powder.

Oxidum antimonii cum phosphate calcis, olim pulvis antimonialis. Edinburgh.—Oxide of antimony with phosphate of lime, formerly antimonial powder.

Take of sulphuret of antimony in coarse powder and hartshorn shavings, each equal parts. Mix, and throw them into a wide iron pot heated to redness, and let them be assiduously stirred until they are burnt into a gray colored matter, which is to be removed from the fire, rubbed to powder, and put into a coated crucible; over which another crucible, having a small hole in its bottom, is to be inverted and luted; then apply the fire, gradually raising it to a white heat, which is to be kept at this heat for two hours. Lastly, reduce the matter when it is cold to a very fine powder.

Sulphur, by the action of heat, is expelled in this process from the sulphuret of antimony, and the metal becomes partially oxidised; this oxide is partially rectified by the subsequent application of heat, and the phosphate of lime of the hartshorn shavings mixes with the antimonial oxide; but whether the mixture be mechanical, or the lime yields part of its phosphoric acid so as to form a phosphate of antimony as well of lime, seems not ascertained. The preparation is uncertain as to strength. It was proposed by Dr. G. Pearson as a close imitation of the celebrated empirical composition which is sold under the name of James's powder.

Qualities.—This powder was formerly much employed as a powerful sudorific at the commencement of fevers; it is at present in much less use than formerly, and perhaps justly so on account of the uncertainty of its dose and operation. It is now principally employed as a mild and alterative diaphoretic, and given in conjunction with guaiacum, calomel, &c. Dose from grs. ij. to grs. vj.

PRÆPARATUM EX ARGENTO.—Preparation of silver.

Argenti nitras. London.—Nitrate of silver.

Take of silver an ounce, nitric acid one fluid ounce, distilled water two fluid ounces. Let the nitric acid and water be mixed together, and the silver dissolved in the mixture on a sand-bath. Then let the heat be gradually increased that the nitrate of silver may be dried. Melt this in a crucible on a gentle fire until, the water having evaporated, the ebullition cease; then pour it directly into proper moulds.

Nitras argenti. Edinburgh.—Nitrate of silver.

Take of pure silver flatted into plates and cut one part, nitric acid diluted two parts, distilled water one part. Dissolve the silver in the acid and water previously mixed together, in a phial with a gentle heat, and let the solution be evaporated to dryness. Then put the mass into a large crucible and place it on the fire, which must be at first gentle and gradually increased till the mass flow in the manner of oil; then pour it into iron pipes previously heated and rubbed with grease. Lastly, the preparation is to be preserved in a well stopped glass vessel.

The silver in this process partly decomposes the acid, it becomes oxidised, and as it oxidises it is dissolved in the remaining acid. The quantity of acid ordered by the colleges is unnecessarily large: ten fluid drachms being amply sufficient for the solution of two ounces of silver.

Qualities.—Nitrate of silver is of a dark gray color, without any smell, but exceedingly

pungent and caustic to the taste. It does not deliquesce when properly prepared and constituted. It is soluble in water and alcohol. '*It is blackened and reduced by exposure to light or a strong heat, by phosphorus, hydrogen gas, and the hydrosulphurets; is precipitated* from its aqueous solution by mercury, copper, and some other metals; and is decomposed by the alkalies with the exception of ammonia, by the alkaline earths, sulphureted hydrogen, the hydrosulphurets, the sulphuric, muriatic, and arsenious acids, the majority of the neutral salts, and by astringent vegetables, solutions, and hard water.'

Medical properties.—Tonic and antispasmodic internally; escharotic when employed externally. It has been used in chorea and other spasmodic affections, but more especially in epilepsy. Dose from one-sixth of a grain to three or four grains. Orfila regards salt as one of its best antidotes when taken in too large a quantity. Dr. Uwins, in his Treatise on Disorders connected with Indigestion, suggests whether the copious use of salt while the patient is taking this medicine might not prevent that discoloration of the skin which is sometimes the result of the continued employment of the nitrate as an internal remedy.

PREPARATA EX ARSENICO.—Preparations of arsenic.

Arsenicum album sublimatum. London.—Sublimed white arsenic.

Rub white arsenic to powder; then put it into a crucible, and applying heat, let it be sublimed in another crucible inverted over the first. A superfluous process.

Liquor arsenicalis. London.—Arsenical solution.

Take of sublimed white arsenic reduced to a very fine powder, subcarbonate of potassa from tartar, of each sixty-four grains, compound spirit of lavender four fluid drachms, distilled water a pint. Let them be boiled together in a glass vessel until the arsenic be entirely dissolved. Add to the solution when it is cold the compound spirit of lavender, and lastly so much distilled water as will make up the whole to a pint.

Solutio arsenicalis. Edinburgh.—Arsenical solution.

Take of oxide of arsenic rubbed to a very fine powder, very pure subcarbonate of potassa, of each sixty-four grains, distilled water fourteen ounces. Boil them together in a glass vessel until all the oxide be dissolved; add to the solution when it is cold half an ounce of the compound spirit of lavender, and so much distilled water as will make the whole sixteen ounces.

Qualities.—In appearance like the compound spirit of lavender. Decomposible by 'lime water, hydrosulphuret of potassa, nitrate of silver, the salts of copper, and instantly forms a copious precipitate when dropped into an infusion or decoction of cinchona bark.'

Medical properties.—Tonic; principally employed in intermittents, and in asthenic headaches. Dr. Thomson tells us that he has given it with decided advantage after cupping and purging in threatened apoplexy, when the strength has been little and the complexion pale. Dose ♏v. gradually increased to ♏xxv. or xxx.

PREPARATUM E BISMUTHO.—Preparation of bismuth.

Bismuthi subnitras. London.—Subnitrate of bismuth.

Take of bismuth one ounce, nitric acid one fluid ounce and a half, distilled water three pints. Mix six fluid drachms of the distilled water with the nitric acid, and dissolve the bismuth in the diluted acid; then let the solution be filtered; add the remainder of the water to the filtered solution, and set it apart that the powder may subside. Next, the supernatant fluid having been poured off, wash the subnitrate of bismuth with distilled water, and, having wrapped it in bibulous paper, let it be dried with a gentle heat.

In this process a hydrated oxide of bismuth is formed, combined with a small proportion of nitric acid.

Qualities.—White, without much smell or taste. Insoluble in water. Sulphureted hydrogen, and all the hydrosulphurets blacken it. Reducible by charcoal.

Medical properties.—Antispasmodic and tonic. Exceedingly useful in those painful affections of the stomach which go under the name of gastrodynia. It is highly lauded by Dr. Yeats and Dr. Uwins. Dose from five grains to eight or ten.

PRÆPARATA E CUPRO.—Preparations of copper.

Ærugo præparata. Dublin.—Prepared verdigris.

Let the verdigris be reduced to powder and the more subtile parts separated in the manner directed for the preparation of chalk.

Cuprum ammoniacum. London.—Ammoniated copper.

Take of sulphate of copper half an ounce, subcarbonate of ammonia six drachms. Rub them together in a glass mortar till the effervescence cease; then wrap up the ammoniated copper in bibulous paper and let it be dried with a gentle heat.

Ammoniaretum cupri. Edinburgh.—Ammoniaret of copper.

Take of pure sulphate of copper two parts, subcarbonate of ammonia three parts. Let them be thoroughly rubbed together in a glass mortar until all effervescence cease, and they form a violet-colored mass, which wrap up in bibulous paper and dry, first on a chalk stone, and subsequently with a gentle heat. Let it be preserved in a well stopped glass phial.

During these processes part of the acid of the sulphate of copper is given to the ammonia. It seems not quite certain whether the resulting compound be 'a subsulphate of oxide of copper and ammonia, or a mixture only of subsulphate of copper and sulphate of ammonia.'

Qualities.—The salt is of a rich blue color; it smells like ammonia and is exceedingly styptic.

Medical properties.—Tonic and antispasmodic. Administered in chorea and epilepsy. Dose a

quarter of a grain, gradually increased to four or five grains.

Liquor cupri ammoniat. London.—Solution of ammoniated copper.

Take of ammoniated copper a drachm, distilled water a pint. Dissolve the ammoniated copper in the water, and let the solution be filtered through paper.

The quantity of water used by the London college is stated to be too much, 'it being a curious fact that the salt is more soluble in a smaller quantity of water, owing to the larger quantity decomposing the subsulphate of copper and leaving an insoluble oxide of copper, which is precipitated.'

Medical properties.—Principally used as a detergent to foul ulcers.

Solutio sulphatis cupri composita. Edinburgh.—Compound solution of sulphate of copper.

Take of sulphate of copper, sulphate of alumina, each three ounces; water two pounds; sulphuric acid one ounce and a half. Let the sulphates be boiled in the water in order to dissolve them, and then add the acid to the liquor filtered through paper.

A mere solution of the sulphates.

Medical properties.—Principally employed in ophthalmic affections, largely diluted.

PRÆPARATA E FERRO.—Preparations of iron.

Limatura ferri purificata. Edinburgh.—Purified filings of iron.

Having placed a sieve over the filings, let a magnet be applied so that it may draw the filings upwards through the sieve.

Oxydum nigrum purificatum. Edinburgh.—Purified black oxide of iron.

Purify the scales of the black oxide of iron that are found at the anvil of the blacksmith, by the application of the magnet; for the magnet attracts the thinner and purer scales only, and leaves the larger and less pure.

Medical properties.—These imperfect oxides are principally used as anthelmintics. Dose from grs. v. to ℈j.

Ferrum ammoniatum. London.—Ammoniated iron.

Take of subcarbonate of iron, muriatic acid, muriate of ammonia, each a pound. Pour the muriatic acid upon the subcarbonate of iron, and set it aside until bubbles cease to arise. Let the solution be filtered through paper and boiled to dryness. Mix intimately the residuum with the muriate of ammonia; then directly sublime by the application of a strong heat: lastly reduce the sublimed matter to powder.

Murias ammoniæ et ferri. Edinburgh.—Muriate of ammonia and of iron.

Take of red oxide of iron washed and again dried, muriate of ammonia, each equal parts by weight. Mix them well together, and let them be sublimed by a quick fire. Reduce the sublimation to powder, and preserve it in a well stopped phial.

In the process ordered by the London college we are told that a mixture of muriate of ammonia and permuriate of iron is produced: the whole of the subcarbonate of iron employed is not dissolved in the acid.

Qualities.—The color of ferrum ammoniacum is of an orange yellow: it has an odor of saffron and rather a styptic taste. It is soluble and deliquescent.

Medical properties.—Tonic and emmenagogue. From being somewhat aperient it is occasionally admissible in cases where other forms of the metal would disagree. We have found it very useful when the combination is required of a deobstruent and tonic. Dose from grs. iij. to ℈ß or more.

Subcarbonas ferri præparatus. Edinburgh.—Prepared subcarbonate of iron.

Let purified filings of iron be frequently moistened with water till they fall into rust, which rust is to be rubbed into powder.

Qualities.—Color of a reddish brown; taste styptic; very little smell.

Medical properties.—Rust of iron has lately been used for tic douleureux. As a tonic and emmenagogue, and vermifuge, in ordinary cases, the dose is from grs. v. to grs. xv.

Ferri subcarbonas. London.—Subcarbonate of iron.

Take of sulphate of iron eight ounces, subcarbonate of soda six ounces, boiling water a gallon. Let the sulphate of iron and subcarbonate of soda be dissolved separately in four pints of water; then mix the solutions together, and set the mixture aside in order that the powder may subside; then decant off the supernatant fluid; wash the subcarbonate of iron in hot water, and let it be dried, wrapped up in bibulous paper, with a gentle heat.

Carbonas ferri præcipitatus. Edinburgh.—Precipitated carbonate of iron.

Take of sulphate of iron four ounces, subcarbonate of soda five ounces, water ten pounds. Let the sulphate be dissolved in the water; then add the subcarbonate previously dissolved in the water, and mix them together. Wash the carbonate of iron which is precipitated with tepid water, and afterwards dry it.

Here a double decomposition is effected: the sulphuric acid of the sulphate of iron unites with the soda, and the carbonic acid is attracted by the iron.

Qualities.—Taste but slightly styptic. Color brown. No smell. Insoluble in water. Decomposible by heat.

Medical properties.—Nearly the same as the last. When given fortic douleureux the dose is sometimes a drachm frequently repeated.

Ferri sulphas. London.—Sulphate of iron.

Take of iron, sulphuric acid, each eight ounces, water four pints. Mix the acid with the water in a glass vessel, and to these add the iron; then, when the effervescence is over, let the solution be filtered through paper; and, after due evaporation, set it apart for crystals to form. Having poured off the liquor, let the crystals be dried on bibulous paper.

Sulphas ferri. Edinburgh.—Sulphate of iron.

Take of iron and sulphuric acid of each by weight eight ounces, water four pints. Mix the sulphuric acid with the water in a glass vessel, and put the iron to them. When the effervescence is over, filter the solution through paper, and after due evaporation set it apart that crysta's may

form. The liquor being poured off, dry the crystals on bibulous paper.

In these processes a sulphate of oxide of iron is formed, the oxygen of part of the water combining with the metal, and its hydrogen being sent off in a gaseous form. The oxide thus produced unites with the sulphuric acid, and a sulphate is formed, which is dissolved in that part of the water which has not undergone decomposition.

Qualities.—Color green, taste styptic, very little odor. Soluble in water and fusible by heat. Decomposed by the following substances, 'the earths, the alkalies and their carbonates; lime water, borate of soda, phosphate of soda, muriate of barytes, nitrate of silver, acetate of lead, and every salt the base of which forms an insoluble compound with sulphuric acid and soaps. It is also decomposed by all infusions of vegetable astringents.'

Medical properties.—Tonic, deobstruent, anthelmintic, and emmenagogue. A very useful preparation. Dose from gr. i. to gr. v.

Sulphas ferri exsiccatus. Edinburgh.—Dried sulphate of iron.

Take of sulphate of iron any quantity. Heat it in an unglazed earthen vessel on a moderate fire, until it become quite dry and white.

This process merely deprives the salt of the water of crystallisation.

Oxidum ferri rubrum. Edinburgh. — Red oxide of iron.

Let dried sulphate of iron be exposed to a violent heat so as to convert it into a red colored matter.

The Dublin college properly order this oxide to be washed in order to separate a portion which still remains of the red sulphate.

Ferrum tartarizatum. London.—Tartarised iron.

Take of iron a pound, supertartrate of potassa in powder two pounds, water five pints, or a sufficient quantity. Let the iron and the supertartrate be rubbed together, and subject the mixture in an open glass vessel with a pint of water to the action of the air for twenty days, daily stirring them and preserving a moisture in the mass by additions of distilled water. Then boil it in four pints of distilled water during fifteen minutes, and filter the solution. Evaporate in a water-bath until the tartarised iron be quite dry. Let it be reduced to powder, and preserved in a stopped bottle.

Tartras potassæ et ferri. Edinburgh.—Tartrate of potassa and of iron.

Take of purified filings of iron one part, supertartrate of potassa in powder two parts, water one part. Rub them together and expose them to the air in a shallow earthen vessel for fifteen days, stirring the mass daily with a spatula, and keeping it moist by frequent additions of water. Then let the whole be boiled for a short time in four times its weight of water, and pour off the solution from the other fæces. Evaporate the solution to dryness in a water-bath; and, having rubbed the mass into powder, let it be kept in a well stopped bottle.

It is suggested by Dr. Thomson that the proportion of supertartrate of potassa employed in these preparations may not be sufficient for the *quantity of metal; the intention is first to oxidate the iron by a partial decomposition of the water* employed, and then to combine this oxide with the superabundant acid of the supertartrate of potassa.

Qualities.—The color of this preparation is of a brownish green; it is without smell, and has but a slightly styptic taste. 'The strong acids, lime water, hydrosulphuret of potassa, and infusions of astringent vegetables decompose it, and are therefore incompatible in formulæ with it.'

Medical properties.—This form of iron has been supposed particularly applicable in dropsy, as combining a diuretic with a tonic quality. Dose ℈ß to ʒß.

Liquor ferri alkalini. London.—Solution of alkaline iron.

Take of iron two drachms and a half, nitric acid two fluid ounces, distilled water six fluid ounces, solution of subcarbonate of potassa six fluid ounces. Mix the acid and the water together, pour the mixture over the iron; and when the effervescence shall have ceased pour off the acid and solution. Add this gradually and at intervals to the solution of subcarbonate of potassa frequently agitating until it become of a brownish red color and no further effervescence be excited. Finally, set it aside for six hours, and pour off the liquor.

In this preparation the diluted acid first oxidises the iron, and, when the subcarbonate of potassa, is added, carbonic acid is extracted and a red precipitate formed, which is ultimately dissolved by the excess of potassa.

Qualities.—Taste slightly styptic and alkaline, exciting a sensation of coldness in the mouth. Water precipitates the alkaline iron, leaving a clear fluid supernatant, which yields, upon evaporation, crystals of nitrate of potassa.

Medical properties.—The same with the other preparations of iron; but scarcely at all employed on account of the uncertainty of its composition and strength.

Tinctura ferri ammoniati. London.—Tincture of ammoniated iron.

Take of ammoniated iron four ounces, proof spirit a pint. Digest and filter.

Tinctura ferri muriatis. London.—Tincture of muriate of iron.

Take of carbonate of iron half a pound, muriatic acid a pint, rectified spirit three pints. Let the acid be poured over the carbonate of iron in a glass vessel, and let the mixture be occasionally shaken for three days. Set it apart that the fæces, if there be any, may subside; then pour off the solution and add to it the spirit.

Edinburgh.—Take of black oxide of iron purified and reduced to powder three ounces, muriatic acid about ten ounces, or sufficient to dissolve the powder. Digest with a gentle heat, and, the powder being dissolved, let so much alcohol be added as will make the whole liquor amount to two pounds and a half.

The London preparation is of a more uniform strength than the Edinburgh formula.

Qualities.—This tincture has a very styptic taste, and is of a yellowish brown color. 'It contains the iron in the state of a chlorate, and

when it is distilled a black oxide of iron remains in the retort. With the alkalies and their carbonates it gives a red precipitate, strikes a black color with infusions of astringent vegetables, and forms with mucilage of acacia gum an orange colored jelly. Hence these substances cannot enter into compositions with this tincture.'

Medical properties.—A useful preparation of iron. It has been given in large doses under some circumstances of suppression of urine. Dose generally from ♏xv. to f. ʒß.

Vinum ferri. London.—Wine of iron.

Take of iron one drachm, supertartrate of potassa in powder six drachms, distilled water two pints or so much as will be necessary, proof spirit twenty fluid ounces. Rub the iron and the supertartrate of potassa together, and expose them in an open glass vessel with one fluid ounce of water to the air for six weeks, stirring daily with a spatula, and frequently adding so much distilled water as may be necessary to keep a moisture in the mass. Then dry it with a gentle heat, rub it to powder, and mix it with thirty fluid ounces of distilled water. Let the solution be filtered and then add the spirit.

Qualities.—This is 'a solution of tartrate of iron and potassa, with an excess of supertartrate of potassa,' the iron being being oxidised and dissolved in the acid of the supertartrate.

Medical properties.—A pleasant preparation of iron. Dose from f. ʒj. to f. ℥ß.

PREPARATA EX HYDRARGYRO.—Preparations of mercury.

Hydrargyrum cum creta. London.—Mercury with chalk.

Take of purified mercury (by weight) three ounces; prepared chalk five ounces. Let them be rubbed together until the globules entirely disappear.

In this preparation something seems to be effected between oxidisement and merely mechanical division of the mercury.

Medical properties.—A most excellent alterative, especially in complaints of children that are marked by lymphatic weakness and mesenteric obstruction. Dose for an adult from grs. vi. to ℈j.

Hydrargyri nitrico oxydum. London.—Nitric oxide of mercury.

Take of purified mercury (by weight) three pounds, nitric acid by weight a pound and a half, distilled water two pints. Mix them in a glass vessel and boil until the mercury be dissolved, and a white mass remain after the water is evaporated. Rub this into powder, and put it into another very shallow vessel; then expose it to a gentle heat, and let the fire be gradually raised until red vapors no longer be emitted.

Oxydum hydrargyri rubrum per acidum nitricum. Edinburgh.—Red oxide of mercury by nitric acid.

Take of purified mercury three parts, diluted nitrous acid four parts. Dissolve the mercury, and evaporate the solution over a gentle fire to a white dry mass, which, being reduced to powder, is to be put into a glass cucurbit, and covered with a thick plate of glass. Then adapt a capital to the vessel, and having placed it in a sand-bath let the contained matter be roasted with a fire gradually raised until small red scales be formed.

Qualities.—'When properly prepared this is a peroxide mixed with some nitrate of mercury.' It appears in the form of bright red scales which are corrosive and acrid; they are insoluble in water but totally soluble in nitric acid, and decomposible by a red heat. 'It is sometimes adulterated with red oxide of lead, which may be detected by dissolving one part of the oxide in four of acetic acid; if lead be present the solution has a sweetish taste; and, when sulphureted water is dropped into it, a dirty dark precipitate is thrown down. When pure it is perfectly volatilised when thrown on a red hot iron.'

Medical properties.—This, the red precipitate of common language, is only used as an external application in cases of chronic, inflammatory, and old sores.

Acetas hydrargyri. Edinburgh.—Acetate of mercury.

Take of purified mercury three ounces, diluted nitrous acid four ounces and a half, or a little more than is necessary to dissolve the mercury, acetate of potassa three ounces, boiling water eight pounds. Mix the mercury with the acid; and towards the cessation of the effervescence digest, if necessary, until the mercury be completely disolved. Then dissolve the acetate of potassa in the boiling water, and immediately to this solution, still hot, add the former, and mix them together by agitation. Set the mixture aside to crystallise; then wash the crystals placed in a funnel with cold distilled water, and finally dry them with a very gentle heat.

In preparing the acetate of mercury it is necessary that all the vessels which are used, and the funnel, be of glass.

In this preparation a nitrate of mercury is first procured by the action of the nitrous acid upon the metal, which nitrate is decomposed by the potassa of the acetate uniting with the acid of the salt; in this way a nitrate of potassa is procured which remains dissolved; and the acetic acid of the acetate combines with oxidated metal, and thus forms the acetate of mercury.

Qualities.—This salt should appear in small flat crystals of a silvery whiteness: it is acrid to the taste; soluble in hot water, but not in alcohol, and decomposed by alkalies and heat.

Medical properties.—It is a form of mercury not much used; in the proportion of grs. ii. to f. ℥ij. of rose water, some have recommended it as a wash in certain cutaneous disorders. Dose gr. i. twice a day.

Hydrargyri oxydum cinereum. London.—Gray oxide of mercury.

Take of submuriate of mercury an ounce, lime-water a gallon. Boil the submuriate of mercury in the lime-water, stirring it assiduously until the gray oxide of mercury subside. Let it be washed with distilled water, and then dried.

Oxidum hydrargyri cinereum. Edinburgh.—Gray oxide of mercury.

Take of submuriate of mercury half an ounce, lime-water five pounds. Boil the submuriate in the solution for a quarter of an hour in a slightly covered vessel. Pour off the supernatant fluid, and let the oxide be washed with distilled water and dried.

The lime water decomposes the submuriate, and the gray precipitate is a protoxide. If calomel be considered a proto-chloride of mercury, we must admit (says Dr. Thomson) that the water of the lime-water is decomposed, and its hydrogen, uniting with the chlorine, forms muriatic acid, which converts the lime into a muriate, while its oxygen changes the mercury into the protoxide.

Qualities.— Color gray. Insipid, without smell, and insoluble in water.

Medical properties.—Some have considered this preparation as an exceedingly useful form of mercury, partly on account of the uniformity of its strength. Dose from gr. i. to grs. iij.

Hydrargyri oxydum rubrum. London.—Red oxide of mercury.

Take of purified mercury (by weight) a pound. Put the mercury into a tall glass vessel with a narrow mouth and broad at the bottom. Subject this vessel open to a heat of 600° until the mercury be converted into red scales, which are then to be rubbed into a fine powder.

The heat in this process volatilises the mercury, and the metal in this state attracts oxygen from the air and is thus converted into a red oxide.

Qualities.—This preparation produces sparkling deep red scales, which are small and exceedingly brilliant, without odor, but of a sharp caustic taste.

Medical properties.—Formerly it was considered an excellent form of mercury for syphilis, but is at present very little employed. Dose from one-sixth or eighth of a grain to one grain. It is apt to affect the bowels, and is therefore usually combined with opium. It is employed by some externally as an escharotic.

Hydrargyri oxymurias. London.—Oxymuriate of mercury.

Take of purified mercury (by weight) two pounds, sulphuric acid thirty ounces (by weight), dried muriate of soda four pounds. Boil the mercury with the sulphuric acid in a glass vessel until the sulphate of mercury become dry; rub this when cold with the muriate of soda in a mortar of earthenware; then sublime it in a glass cucurbit, with a heat gradually raised.

Murias hydrargyri corrosivus. Edinburgh.—Corrosive muriate of mercury.

Take of purified mercury two pounds, sulphuric acid two pounds and a half, dried muriate of soda four pounds. Boil the mercury with the sulphuric acid in a glass vessel placed in a sand bath until the material become dry. Mix this when cold in a glass vessel with the muriate of soda; then sublime in a glass cucurbit with a heat gradually raised. Separate the matter sublimed from the scoriæ.

'According to the latest doctrines, the chlorine of the common salt leaves the sodium and uniting with the mercury of the hypersulphate forms a bichloride of mercury which sublimes, while the oxygen of the oxide of mercury combining with the sodium converts it into soda, which unites with the sulphuric acid, and forms sulphate of soda which remains in the bottom of the cucurbit.'

Qualities.—Corrosive sublimate, as it was formerly called, appears in the form of very small shining white crystals, which have a very acrid taste, and are without smell; they effloresce by exposure to the air. It is soluble in water, alcohol, and the acids. Alkalies and oils precipitate and reduce it. 'It is also decomposed by solutions of tartrate, of potassa, and antimony, nitrate of silver and acetate of lead, and forms precipitates in infusions and decoctions of the following vegetable substances. Camomile flowers, horse radish root, columba root, catechu, cinchona-bark, rhubarb root, senna leaves, simaruba bark, oak bark, tea, and in the almond mixture, consequently it is incompatible in extemporaneous formulæ with these substances.

Medical properties.—Formerly very much employed in syphilitic affections; and still constituting the main ingredient of several patent medicinals which profess to contain no mercury in their composition. At present it is more used in chronic affections of the skin than in any other disorder, whether these have or have not a syphilitic origin and character. Dose from one-tenth of a grain to a fourth, two or three times a day.

Liquor hydrargyri oxymuriatis. London.—Solution of oxymuriate of mercury.

Take of oxymuriate of mercury eight grain , distilled water fifteen fluid ounces, rectified spirit a fluid ounce. Let the oxymuriate of mercury be dissolved in the water and the spirit added.

The dose of this solution is from f. ʒß. to f. ʒij. each fluid ounce containing half a grain of the salt. The solution should not be kept long nor exposed to a strong light, as it thus becomes decomposed and throws down calomel. This solution is externally useful in tetters diluted with half its measure of water.

Hydrargyrum præcipitatum album. London.—White precipitated mercury.

Take of oxymuriate of mercury half a pound, muriate of ammonia four ounces, solution of subcarbonate of potassa half a pint, distilled water four pints. Dissolve first the muriate of ammonia, then the oxymuriate of mercury in the distilled water, and add to the mixed solution the solution of subcarbonate of potassa. Let the precipitated powder be washed until it become tasteless, then it is to be dried.

The Dublin College order the precipitate to be made by an addition to the fluid poured off from the precipitated submuriate of a quantity of water of ammonia, which Dr. Thomson remarks is a more simple and a more economical mode of obtaining the product. The corrosive muriate, it will be recollected, is held in solution by the fluid in question, and is precipitated by the ammonia.

Qualities.—Muriate of mercury and ammonia (so Dr. Thomson names it) is without smell or taste; it is a smooth white insoluble powder. When adulterated with white lead the fraud may be detected 'by digesting one part of it in four parts of acetic acid, and adding to the solution a small quantity of sulphuret of ammonia; a black precipitate, insoluble in sulphuric acid, indicates the presence of lead. Chalk and starch are also sometimes mixed with it, and may be detected by heating the preparation in an iron spoon; if pure it is completely volatilised, but if

adulterated with starch a black coal is left; or if with chalk a white powder at the bottom of the spoon.

Medical properties.—Used only as an ointment in psora and other affections of the skin.

Hydrargyrum purificatum. London.—Purified mercury.

Pour mercury into an iron retort, and having applied heat distil the purified mercury.

Hydrargyrus purificatus. Edinburgh.—Purified mercury.

Take of mercury six parts, filings of iron one part. Rub them together and distil from an iron retort.

Hydrargyri submurias. London.—Submuriate of mercury.

Take of purified. mercury (by weight) four pounds, sulphuric acid (by weight) thirty ounces, muriate of soda one pound and a half, muriate of ammonia eight ounces. Boil two pounds of the mercury with the sulphuric acid in a glass vessel until the sulphate of mercury be dry; when this is cold let it be triturated with two pounds of mercury in an earthen mortar, that they may be perfectly mixed. Then add the muriate of soda, and rub them together till all globules disappear; afterwards sublime. Reduce the sublimed matter to a very fine powder; pass it through a sieve, and mix it carefully with the muriate of ammonia previously dissolved in a gallon of boiling distilled water. Set it aside that the powder may subside. Pour off the solution, and wash the powder repeatedly with distilled water, boiling until solution of ammonia dropped into it throw nothing down. Finally, reduce it to a very fine powder in the manner directed for the preparation of chalk.

Submurias hydrargyri mitis sive calomelas. Edinburgh.—Mild submuriate of mercury or calomel.

Take of muriate of mercury four parts, purified mercury three parts. Rub the muriate in a glass mortar with a little water in order to prevent the acrid powder from rising; then add the mercury, and again triturate until it be extinguished. Put the dried mass into an oblong phial, one-third only of which it shall fill, and sublime it in a sand-bath. Again let the sublimed powder be triturated, and again sublimed; then reduce it to a fine powder, which is lastly to be well washed with boiling distilled water.

This very important preparation is a protochloride of mercury (and not a submuriate). In the process of the London College, following the old doctrines, the mercury is first formed into a persulphate, which is mixed with the common salt, and converted into corrosive sublimate, but which, at the moment of its formation, is again decomposed by the ammonia of the muriate of ammonia, and converted into calomel. But supposing, as is actually the case, that the corrosive sublimate which is formed is a perchloride, this is changed into calomel by one-half of the chlorine uniting with the additional portion of mercury and forming a protochloride. By triturating metallic mercury, as directed by the two other colleges, with the corrosive muriate the whole mass assumes a gray color. The sublimations render the combination of the mercury with the chloride and its reduction to the state of protochloride complete; but this is not the case in the first sublimation, for both metallic mercury and corrosive muriate are found unchanged in the sublimed mass; and thence the necessity of the second trituration and subsequent sublimations. By repeating, however, the sublimation too often the product is injured, as corrosive muriate is formed in each sublimation. The final trituration and levigation are intended to separate any corrosive muriate that may have been formed. In performing the process, the addition of a little water during the trituration of the ingredients in the first instance is very necessary; as otherwise the operator is apt to suffer extremely from the acrid powder of the corrosive muriate which is elevated.'—Thomson.

Qualities.—Calomel is of a dull white appearance, without odor or taste; it is insoluble. It is rendered black by trituration with lime-water and the alkalies, and it is also decomposed by sulphureted hydrogen and the hydrosulphurets, by antimony, iron, lead, copper, and soap.

Medical properties.—This preparation in different doses, according to circumstances, is in greater use than any other form of mercury. It is employed as a purgative, alterative, and deobstruent, and antispasmodic, and, indeed, as a diuretic and sedative, when combined with other substances and duly proportioned as to dose, which varies from the sixth of a grain to many grains and even scruples.

Submurias hydrargyri præcipitatus. Edinburgh.—Precipitated submuriate of mercury.

Take of diluted nitrous acid, purified mercury, of each eight ounces, muriate of soda four ounces and a half, boiling water eight pounds. Mix the mercury with the diluted nitrous acid, and towards the termination of the effervescence digest with a gentle heat, frequently shaking the vessel. It is necessary for more mercury to be mixed with the acid than it can dissolve, so that a completely saturated solution be obtained.

Dissolve at the same time the muriate of soda in the boiling water; then to this add the other solution while it is yet warm, and mix them very quickly together. After the precipitate has subsided pour off the saline fluid, and wash the submuriate of mercury by frequent affusions of warm water, which are to be poured off each time after the precipitate subsides, until the water come off tasteless.

In this process the mild muriate is mixed with the subnitrate of mercury, by which its powers are modified; for the metal is oxydised to a maximum by solution in nitric acid with heat, and a subnitrate is precipitated by the addition of water. Heat, therefore, ought not to be employed in the process.

Qualities.—Calomel prepared in the above way is smoother and not so heavy as that obtained by sublimation, but otherwise is similar, with the exception of its containing the subnitrate if prepared with heat according to the direction of the college.

Medical properties.—Essentially the same with common calomel.

Hydrargyri sulphuretum nigrum. London.—Black sulphuret of mercury.

Take of purified mercury (by weight) one pound, sublimed sulphur a pound. Let them be rubbed together till the globules disappear.

Sulphuretum hydrargyri nigrum. Edinburgh.—Black sulphuret of mercury.

Take of purified mercury, sublimed sulphur, of each equal weights. Let them be triturated together in a glass mortar with a glass pestle, until the globules of mercury altogether disappear. It may also be made with double the quantity of mercury.

It seems that some chemical combination is effected by the trituration of the mercury with the sulphur, but that the metal is not, as it had been supposed by Fourcroy, at all oxidated.

Qualities.—The black sulphuret of mercury is without taste or smell. The application of heat occasions it to emit sulphurous acid gas. When adulterated with ivory black, which is not seldom the case, the fraud may be detected by throwing the mass on a red hot iron, when ashes will be left if there had been any admixture of the ivory black.

Medical properties.—It has been chiefly employed as an alterative in cutaneous affections, and as a remedy against worms. Dose from gr. v. to ʒß.

Hydrargyri sulphuretum rubrum. London.—Red sulphuret of mercury.

Take of purified mercury (by weight) forty ounces, sublimed sulphur eight ounces. Having melted the sulphur over the fire, mix the mercury, and immediately upon the swelling of the mass remove the vessel from the fire, and cover it with force in order to prevent it from catching fire; then rub it into powder and sublime.

Qualities.—This preparation (cinnabar) is of a bright vivid red color, without taste and insoluble. 'It is sometimes adulterated with red lead, dragon's blood, and chalk: the first is discovered by the same process as was described for discovering it in the red oxide; spirit of wine detects the second by extracting the coloring matter; and the last is discovered by an effervescence being excited by muriatic acid, and the production of sulphate of lime on adding sulphuric acid.

Medical properties.—Deobstruent and alterative. Not at present much employed. Dose for internal use gr. x. to ʒß. Factitious cinnabar, as it has been called, is used by some for fumigating venereal ulcers in the throat.

Subsulphas hydrargyri flavus. Edinburgh.—Yellow subsulphate of mercury.

Take of purified mercury two parts, sulphuric acid three parts. Put them into a glass cucurbit, placed in a sand-bath, and boil them to dryness. Pulverise the white mass left at the bottom of the vessel, and throw it into boiling water. It will be immediately changed into a yellow powder, which is to be washed with frequent affusions of warm water.

In this process a supersulphate of mercury is first formed; but the continued application of heat expels and partly decomposes a portion of the acid, the metal becomes more oxidised, and a subsulphate is produced.

Qualities.—This preparation is of a fine bright yellow; it is without smell, but of an acrid taste. It is changed by rubbing it with mercury into the black oxide; and a red heat reduces it to its metallic state by expelling its oxygen.

Medical properties.—Principally used as an errhine. It has been found extremely useful in chronic ophthalmia, and diseases of the head; but even for this purpose its acrimony requires to be sheathed with some bland powder, as starch or liquorice root, powder in the proportion of grs. v. to gr. j. of subsulphate. In doses of grs. v. it operates as a powerful emetic.

PRÆPARATA E PLUMBO.—Preparations of lead.

Plumbi acetas. London.—Acetate of lead.

Take of subcarbonate of lead a pound, strong acetic acid one pint, boiling distilled water one pint and a half. Mix the acid with the water. To these add the subcarbonate of lead, gradually; then filter the solution through paper, and, having evaporated it until a pellicle appear on the surface, set it apart for the formation of crystals. Pour off the fluid, and let the crystals be dried upon bibulous paper.

Acetas plumbi. Edinburgh.—Acetate of lead.

Take of white oxide of lead any quantity, weaker acetic acid a sufficient quantity. Put the oxide into a cucurbit, and pour over it ten times its weight of the acid. Let the mixture stand upon a warm sand-bath until the acid becomes sweet; then pour it off, and add fresh acid in successive portions, until no more sweetness is communicated. Evaporate all the fluid freed from impurities in a glass vessel to the consistence of thin honey, and set it aside in a cold place for crystals to form, which are to be dried in the shade. Again evaporate the residuary liquor that new crystals may be obtained, and repeat the evaporation until no more be formed.

These processes are seldom employed, the acetate of the shops being generally that which is obtained on a large scale by treating sheets of lead with distilled vinegar.

Qualities.—Acetate of lead (sugar of lead) is possessed of an astringent and sweet taste; it is in the form of white crystals. It is slightly efflorescent, and is soluble. It is decomposed by the alkalies and their carbonates, most of the acids and neutral salts, lime, magnesia, and all the sulphurets; but it is not affected by a solution of gum.

Medical properties.—Powerfully astringent and sedative. Dose from a quarter of a grain to a grain. It is in the general way best to combine it with about half its quantity of opium. Externally it is much used as a collyrium in the proportions of fifteen grains or a scruple to half a pint of water.

Liquor plumbi subacetatis. London.—Solution of subacetate of lead.

Take of semivitrified oxide of lead two pounds, acetic acid (distilled vinegar) a gallon. Mix them, and boil them down to six pints, stirring assiduously; then set the solution aside that the impurities may subside, and strain it.

Qualities.—This solution is of a greenish-straw color, with a sweetish and rather caustic taste. 'It is partially decomposed when largely diluted with distilled water; and with pump

water a heavy precipitate immediately takes place; it is also precipitated in the form of a white subsalt by the alkalies and their carbonates; and a black precipitate is produced by the alkaline sulphurets. It is indeed the best test for diluting sulphureted hydrogen in any compound. This solution is also incompatible with solutions of mucilage, the gum of which it coagulates; and it is the most delicate test for mucilage with which we are acquainted.

Medical properties.—Only employed externally. It is called Goulard's extract from having been introduced into practice by a surgeon of Montpelier of that name.

Liquor plumbi subacetatis dilutus. London.—Diluted solution of subacetate of lead.

Take of solution of subacetate of lead a fluid drachm, distilled water a pint, proof spirit a fluid drachm. Mix them.

A superfluous preparation, inasmuch as the dilution is easily made extemporaneously, and of strength according to circumstances.

Præparata e Zinco.—Preparations of zinc.

Calamina præparata. London.—Prepared calamine.

Calcine the calamine and beat it to powder; then bring it into a state of very fine powder, in the manner directed for preparing chalk.

Carbonas zinci impurus præparatus. Edinburgh.—Prepared impure carbonate of zinc.

Having rubbed to powder, in an iron mortar, impure carbonate of zinc roasted by those who make brass; and having levigated it with a little water on a porphyry, it is to be put into a large vessel and water poured over it, which, after frequently agitating the vessel, is to be poured off loaded with the powder. The fine powder which subsides after the water has remained at rest is then to be dried. The coarse which the water cannot suspend is again to be levigated and treated as before.

Medical properties.—Calamine is principally employed in the form of a dry powder to the excoriations to which infants are subject, and is an exceedingly useful application.

Oxidum zinci impurum præparatum. Edinburgh.—Prepared impure oxide of zinc.

It is prepared in the same manner as the impure carbonate of zinc.

Zinci oxidum. London.—Oxide of zinc.

Take of sulphate of zinc one pound, solution of ammonia one pint, or so much as may be required, distilled water one pint. Dissolve the sulphate of zinc in the distilled water, and add so much solution of ammonia as may be necessary entirely to precipitate the oxide of zinc. Pour off the solution, wash the powder repeatedly with distilled water, and dry it upon a sand-bath.

Oxidum zinci. Edinburgh.—Oxide of zinc.

Let a large crucible be placed in a furnace filled with burning coals in such a manner as to be somewhat inclined to its mouth, and when the bottom of it is heated to a moderate degree of redness throw into it a piece of zinc of about a drachm weight. The zinc is soon inflamed and converted into white flocculi, which are occasionally to be removed from the surface of the metal by means of an iron spatula, for the completion of the combustion; when the inflammation is over, let the oxide of zinc be removed from the crucible. Then throw in another piece, and let the operation be repeated as often as necessary. Finally, let the oxide of zinc be prepared in the same manner as the impure carbonate of zinc.

The quantity of water ordered by the London College is said to be too small. Mr. Brande as quoted by Dr. Thomson says the word congium should be substituted for octarium.

Qualities.—Insipid, of a pure white color and infusible, insoluble in water and alcohol, but soluble in acids. It is often adulterated with chalk, and sometimes contains white lead. By pouring sulphuric acid on the specimen, the first is discovered by the effervescence which is excited, the second by an insoluble sulphate of lead being formed.

Medical properties.—Tonic and antispasmodic. Considerably employed in chorea and epilepsy. Dose gr. i. to grs. v.

Zinci sulphas, London.—Sulphate of zinc.

Take of zinc broken into small pieces four ounces, sulphuric acid by weight six ounces, water four pints. Mix them in a glass vessel, and, when the effervescence is over, filter the solution through paper; then boil it until a pellicle begin to form on the surface, and set it aside to crystallise.

Edinburgh.—Take of zinc cut into small pieces three parts, sulphuric acid five parts, water twenty parts. Mix, and the effervescence being over digest for a short time on hot sand. Then filter the decanted solution through paper, and after due evaporation set it apart for the formation of crystals.

In these processes the zinc decomposes the water by the aid of the acid, and the oxygen of the water being attracted by the metal hydrogen becomes disengaged with effervescence. The greatest portion of the sulphate of zinc which is used in the shops is prepared by exposing blende in such a way that white vitriol, as it is called, results. This white vitriol is purified by solution in water, the solution being allowed to evaporate slowly in an open vessel containing some granulated zinc; by this process any sulphate of lead that may be mixed with the sulphate of zinc is caused to subside, and the other salts are decomposed by the metallic zinc.

Qualities.—The preparation is probably a supersulphate; its taste is acidulous and metallic, it is without smell. 'It is decomposed by the alkalies, earths, and hydrosulphurets; and throws down a dirty looking precipitate, from astringent vegetable infusions, with which therefore it is incompatible in prescriptions.'

Medical properties.—Tonic, antispasmodic, and astringent. In scruple or half drachm doses it is emetic. It is also employed in external affections, especially in ophthalmic complaints accompanied by a laxity of vessel. Dose as a collyrium ℈j. to half a pint of rose water. Dose for internal administration from one grain to three or four.

Solutio sulphatis zinci. Edinburgh.—Solution of sulphate of zinc.

Take of sulphate of zinc sixteen grains, water eight ounces, diluted sulphuric acid sixteen drops. Dissolve the sulphate of zinc in the water, and, after adding the acid, filter the solution through paper.

Solutio acetatis zinci. Edinburgh.—Solution of acetate of zinc.

Take of sulphate of zinc one drachm, acetate of lead four scruples, distilled water twenty ounces. Dissolve. Let the salts be mixed separately in ten ounces of the water; then mix the solutions, and, after the precipitate has subsided, filter.

Here there is a double decomposition; the sulphate of zinc gives out its sulphuric acid to the oxide of lead contained in the acetate, and the zinc, reduced to the state of oxide, combines with the acid of the acetate of lead; the acetate of zinc remains in solution and is thus easily separated from the sulphate of lead by filtering.

Medical properties.—Employed principally as a collyrium, and in gonorrhœa after the inflammation has subsided.

SULPHUREA.—Preparations of sulphur.

Oleum sulphuratum. London.—Sulphureted oil.

Take of washed sulphur two ounces, olive oil a pint. Add the sulphur to the oil gradually, the oil being heated in a very large iron pot; stir the mixture after each addition till union is produced.

Qualities.—Smell fetid and taste acrid, color of a reddish brown; it emits sulphureted hydrogen when subjected to heat.

Medical properties.—Stimulant; and, when employed externally, cleansing or detergent. It was formerly much employed in chronic affections of the chest, under the notion of its healing nature, in doses of from ♏ v. to ♏ xxx.

Potassæ sulphuretum. London.—Sulphuret of potassa.

Take of washed sulphur an ounce, subcarbonate of potassa two ounces. Rub them together and place the mixture in a covered crucible over the fire until they unite.

Sulphuretum potassæ. Edinburgh.—Sulphuret of potassa.

Take of subcarbonate of potassa two parts, sublimed sulphur one part. Rub them together and put them into a large covered crucible, to which, a cover being adapted, apply the fire cautiously until they melt. Preserve the mass in a well closed vessel.

We are told that in order to effect a complete combination the subcarbonate should be exposed in a crucible to a red heat previously to its being rubbed with the sulphur; the water of the subcarbonate would thus be dissipated, and at the same time a portion of the carbonic acid expelled, both of which, when not driven off, alter the product. So that the directions of the colleges for the preparation are defective.

Qualities.—Without much odor when dry, but emitting sulphureted hydrogen when moistened. Taste acrid, texture brittle, breaking with a glassy fracture of a brown color. It attracts moisture from the air, thereby becomes green, and gradually changed into a hydrogureted sulphuret of potassa, combined with a small portion of sulphate of potassa. It is decomposed by acids, and its sulphur sublimes when the mass is exposed to a violent heat.

Medical properties.—Alterative and in some degree diaphoretic. It has been much used to allay the extreme irritation of prurigo, and also employed in other cutaneous, as also in rheumatic and pulmonary disorders. Dose from gr. v. to gr. x.

Sulphur lotum. London.—Washed sulphur.

Take of sublimed sulphur a pound. Pour boiling water upon it, so that the acid, if there be any, may be washed away; then dry it.

Sulphur sublimatum lotum. Edinburgh.—Washed sublimed sulphur.

Take of sublimed sulphur one part, water four parts. Boil the sulphur for a short time in the water; then pour off this water, and by repeated affusions of cold water, let all the acid be washed away. Lastly, dry the sulphur.

Sulphur præcipitatum. London.—Precipitated sulphur.

Take of sublimed sulphu a pound, fresh burnt lime two pounds, water four gallons. Boil the sulphur and the lime together in the water, then filter the liquor through paper, and let as much muriatic acid be dropped into it as may be sufficient to precipitate the sulphur. Lastly, wash this with repeated affusions of water until it lose all taste.

'In the first part of this process a hydrogureted sulphuret of lime is produced, by the combination of the lime and sulphur occasioning a decomposition of part of the water, the hydrogen of which unites with a portion of the sulphur, and forms a hydrosulphuret, while the oxygen with another portion forms sulphuric acid that combines with part of the lime; and thus the solution contains a small portion of sulphate of lime, and a sulphuret of lime, or rather the base of lime, calcium, combined with sulphureted hydrogen. This hydrogureted sulphuret is then decomposed by the muriatic acid, which unites with the lime, and forms a soluble muriate while the sulphur is precipitated, and sulphureted hydrogen gas is disengaged.'—Thomson.

Qualities.—Color white, inclining to green; not materially differing from sublimed sulphur.

Hydrosulphuretum ammonæ. Edinburgh.—Hydrosulphuret of ammonia.

Take of water of ammonia, sulphuret of iron, of each four ounces, muriatic acid eight ounces, water two pounds and a half. Pour the acid previously mixed with the water on the sulphuret, and transmit the evolved gas through the water of ammonia. Preserve the solution in well-stopped phials.

Qualities.—Color of a dark green, odor fetid, and taste acrid. Acids decompose it.

Medical properties.—Sedative. It has been principally employed in diabetes. Dose from ♏v. gradually increased.

VEGETABILIA.—Vegetables.

For collecting vegetables we have the following directions given by the London college.

Vegetables are to be gathered from the soil and place where they grow spontaneously, in a

dry season, and when no dew is found upon them; they are to be collected yearly, and any that shall have been kept for more than a year are to be thrown away.

Roots are for the most part to be dug up before the shooting out of their stems or leaves.

Barks are to be collected at that season in which a separation from the wood is more easily effected.

Leaves are to be gathered after the expansion of the flowers, and before the seeds have come to maturity.

Flowers are to be gathered when they are just open.

Seeds are to be collected when ripe, and before they drop from the plant. They ought to be preserved in their seed vessels.

Vegetabilium præparatio. London.—Preparation of vegetables.

Vegetables soon after being gathered, except those which are to be used in a recent state, are to be lightly spread out and dried as quickly as may be, with a gentle heat, so that their color shall not be altered; they are then to be preserved in proper situations or vessels where light and moisture are excluded.

Roots which we desire to be preserved fresh are to be buried in dry sand. The squill root, before drying, is to be denuded of its arid coats, and transversely cut into thin slices.

Pulpy fruits if they be not ripe, or if they be ripe and dried, are to be placed in a damp situation that they may become soft; then the pulp must be pressed out through a hair sieve; then boiled with a gentle heat, frequently stirring; and lastly the water evaporated in a water bath until the pulp acquire a due consistence.

Over the bruised pods of cassia pour boiling water so as to wash out the pulp, which is first to be pressed through a sieve with large holes, and afterwards through a hair sieve; then the water is to be dissipated in a water-bath, until the pulp acquire a due consistence.

The pulp or juice of ripe and fresh fruits is to be pressed through a sieve without boiling.

Vegetabilium exsiccatio. Edinburgh.—The drying of herbs and flowers.

Herbs and flowers should be dried by the gentle heat of a stove or a common fire in such quantity at once as will admit of the operation being very speedily finished; for thus are their powers better preserved, the indication of which is the complete preservation of their natural color.

The leaves of hemlock, and of other plants containing a subtile volatile matter, are immediately upon being dried to be reduced to powder, and kept in well stopped glass vessels.

The root of the sea-quill freed from its outer coat is to be transversely cut into thin slices. The indication of its being properly dried is the retention of its bitterness and acrimony after it has become friable.

Pulparum extractio. Edinburgh.—Extraction of pulps.

Fruits which afford a pulp, if unripe, or if ripe and dry, are to be boiled in a small quantity of water till they become soft; then the pulp should be pressed through a hair sieve, and afterwards boiled with a gentle heat in an earthen vessel, stirring frequently in order to prevent it from burning, until it acquire the consistence of honey.

In like manner the pulp of cassia fistula is to be boiled out from the bruised pod, and then brought to a due consistence by the evaporation of the water. The pulps of fresh and ripe fruits are to be pressed through a sieve without previous boiling.

Succi spissati. Edinburgh.—Inspissated juices.

Beat the fresh substance and press it strongly through a canvas bag so as to obtain the juice, which being put into a wide and shallow vessel, and heated by means of boiling water saturated with sea salt, is to be reduced to the consistence of honey. The mass when cold is to be put into glazed earthen vessels, and moistened with strong alcohol.

Gummi resinæ. London.—Gum-resins.

Separate opium very carefully from all extraneous matter, particularly from that on its outside. Let it be preserved in a soft state proper for forming pills, and in a state of hardness such as can be produced by drying it in the heat of a water-bath, so that it may be reducible to powder.

Those gum resins are to be considered the best which can be selected so free from impurity as to require no purifying operation. If, however, they appear less pure, boil them in water until they soften, and squeeze them by a press through a hempen bag: then set them apart that the resinous matter may subside. Pour off the supernatant fluid, and evaporate it by a water-bath heat, adding the resinous portion towards the end of the operation, that it may combine with the gummy part.

Those gum resins which liquify readily are to be purified by putting them into an ox bladder, and holding them in boiling water until they become sufficiently soft to be freed from impurities by pressing them through a hempen bag.

Dissolve the balsam of storax in rectified spirit and strain; then distil off the spirit by a gentle heat, until the balsam acquire a due consistence.

OLEA EXPRESSA —Expressed oils.

Oleum amygdalarum. London.—Oil of almonds.

Macerate almonds either bitter or sweet in cold water for twelve hours, and bruise them; then express the oil without heat.

Oleum amygdali communis. Edinburgh.—Oil of the almond.

Take fresh almonds and bruise them in a stone mortar; then put them into a hempen bag, and express the oil by a press without heat.

Medical properties.—Demulcent and emollient. Dose from f. ℥ß to f. ℥j.

Oleum lini. London.—Oil of linseed.

Bruise the seeds of common flax, and then express the oil without heat.

Medical properties.—Laxative as well as demulcent and emollient. It has been much recommended by some in hæmorrhoidal affections; but it is principally used either as an external application in cases of burns and scalds, or in

the form of enemata. Dose by the mouth from f. ʒß to f. ℥j. as an enema from f. ℥iij. to f. ℥vj.

Oleum ricini. London.—Castor oil.

Bruise the seeds of castor, first deprived of their pellicles, and express the oil without heat.

Olea Distillata.—*Distilled or volatile oils.*

Olea distillata. London.—Distilled oils.

The seeds of anise and carraway, the flowers of chamomile and lavender, the berries of juniper and all-spice, the tops of rosemary, and the whole plants of the other articles are to be used.

Any one of these is to be put into an alembic, and so much water is to be added as will cover it, the oil is then to be distilled in a large refrigeratory.

The water which distils over with the carraway, peppermint, spearmint, all-spice, and pennyroyal is to be kept for use.

Olea volatilia. Edinburgh.—Volatile oils.

So much water only is to be used as will prevent empyreuma during distillation. The distillation may be immediately commenced after due maceration, and the oil afterwards separated from the water.

It is also necessary to observe in preparing these oils and the distilled waters, that the quality of the materials, their texture, the time of the year, and other circumstances may occasion so many differences, that it is hardly possible to give any certain and general rules which shall strictly apply in all cases. Many things, therefore, which must be regulated by the judgment of the operator, are omitted, and the more general only given.

Oleum anisi. London. *Oleum volatile pimpinellæ anisi.* Edinburgh.—Oil of aniseed.

This is sometimes adulterated with water, spermaceti, or camphor; but the fraud is easily detected, for, on moderately warming the genuine oil, the crystals dissolve, which is not the case with sophisticated. The greater part of the oil of aniseed consumed in this country is prepared in Spain.

Medical properties.—Carminative. Dose ♏v.

Oleum anthemidis. London. *Oleum volatile anthemidis nobilis.* London.—Oil of chamomile.

Medical properties.—Stomachic and carminative. Dose ♏v.

Oleum carui. London.—Oil of carraway.

Medical properties.—Stimulant and carminative. Dose from ♏j. to ♏v

Oleum juniperi. London. *Oleum volatile juniperi communis.* Edinburgh.—Oil of juniper.

This when genuine is soluble in alcohol.

Medical properties.—Diuretic and carminative. Dose ♏iij.

Oleum lavandulæ. London. *Oleum volatile Lavendulæ spicæ.* Edinburgh.—Oil of lavender.

Medical properties.—Stimulant and cordial. Dose from ♏i. to ♏v. on sugar.

Oleum volatile lauri sassafras. Edinburgh.—Oil of sassafras.

Medical properties.—Sudorific, diuretic, and stimulant. Not much employed. Dose ♏ij. to ♏vj.

Oleum menthæ piperitæ. London.—*Oleum volatile Menthæ piperitæ.* Edinburgh.—Oil of peppermint.

Medical properties.—Stimulant and carminative. Dose ♏j. to ♏iij.

Oleum menthæ viridis. London.—Oil of spearmint.

Medical properties.—The same as the peppermint, but less pungent.

Oleum origani. London. *Oleum volatile origani marjoramæ.*—Oil of common marjoram.

Medical properties.—Not used internally. Occasionally applied to a carious tooth to ease the pain, two or three drops being put on a piece of cotton and inserted into the tooth.

Oleum pimentæ. London. *Oleum volatile myrti pimentæ.* Edinburgh.—Oil of pimento.

Medical properties.—Stomachic and stimulant. Dose from ♏iij. to ♏v. in sugar or any proper vehicle.

Oleum pulegii. London.—Oil of pennyroyal.

Medical properties.—Stimulant, but not in much use. Dose ♏ij. to ♏v.

Oleum rosmarini. London. *Oleum volatile rorismarini.* Edinburgh.—Oil of rosemary.

This when long kept deposits crystals of camphor.

Medical properties.—Stimulant. It is used externally in combination with other materials as a liniment. Dose for internal use ♏ij. to ♏vj.

Oleum herbæ juniperi sabinæ. Edinburgh.—Oil of savine.

Medical properties.—Savine is supposed by some to possess specifically emmenagogue properties. Dose of the oil from ♏ij. to ♏iv.

Oleum succini. London.—Oil of amber.

Put the amber into an alembic, and distil from a sand-bath, with a gradually raised heat, an acid liquor, the oil, and a salt impregnated with oil. Then redistil the oil a second time and a third time.

Oleum succini. Edinburgh.—Oil of amber.

Take of amber in powder, and of pure sand equal parts. Mix them together in a glass retort, the capacity of which the mixture only half fills; and, having adapted a large receiver to it, distil in a sand-bath with a gradually increased heat. An aqueous fluid tinged with a little yellow oil will come over first; then a yellow oil with an acid salt; and lastly a black and reddish oil. Pour the fluid from the receiver, and separate the oil from the water.

Oleum succini purissimum. Edinburgh.—Pure oil of amber.

Distil the oil of amber mixed with six times its quantity of water, from a glass retort, until two-thirds of the water pass into the receiver. Then separate this purified oil from the water and preserve it in well stopped phials.

Qualities.—Exceedingly strong and unpleasant odor. Insoluble in water and only partially soluble in alcohol.

Medical properties.—Stimulant and rubefacient. Occasionally it has been used internally in cases of obstructed menstruation, and in some hysteric and spasmodic complaints. Dose ♏v. to ♏x. Externally it is used in combination with opium in hooping cough and rheumatic affections, and tic douleureux.

Oleum terebinthinæ rectificatum. London.—Rectified oil of turpentine. Take of oil of turpentine a pint, water four pints: distil.

Oleum volatile pini purissimum. Edinburgh.—Purified oil of turpentine.

Take of oil of turpentine one part, water four parts. Distil so long as any oil comes over.

Medical properties.—Anthelmintic, antispasmodic, and antirheumatic. Dose for worms f. ℥j.; for epilepsy ♏xxx.; for rheumatism f. ʒj. Its effects on the kidneys may be guarded against by combining it with acacia mucilage, or giving this mucilage for drink in combination with barley water.

Aquæ Distillatæ.—Distilled waters.

The London college gives the following direction for the preparation of distilled waters.

Waters are to be distilled from dry plants unless it be otherwise ordered; because fresh plants cannot be procured at all times of the year. When fresh plants are employed, the weight of them ordered is to be doubled.

To every gallon of these waters let five fluid ounces of proof spirit be added, in order to preserve them from spoiling.

Aqua distillata. London.—Distilled water.

Take of water ten gallons. First distil four pints which are to be thrown away, and then distil four gallons. Keep the distilled water in a glass bottle.

Aqua distillata. Edinburgh.—Distilled water.

Let water be distilled in clean vessels until two-thirds of the quantity employed have passed over.

'Distilled water is necessary in formulæ containing any of the following substances: acidum sulphuricum, acidum citricum, antimonium tartarizatum, argenti nitras, cuprum ammoniatum, ferrum tartarizatum, hydrargyri oxymurias, liquor ammoniæ, liquor plumbi acetatis, liquor potassæ, plumbi superacetas, solutio muriatis barytæ, vinum ferri, zinci sulphas, ferri sulphas.' *Thomson.*

Aqua anethi. London.—Dill water.

Take of dill seeds bruised a pound, pour upon them so much water as during the distillation may be sufficient to prevent empyreuma. Let a gallon be distilled.

Aqua carui. London.—Carraway water.

Take of bruised carraway seeds a pound, pour on them water enough to prevent empyreuma during distillation. Let a gallon be distilled.

Aqua citri aurantii. Edinburgh.—Water of orange peel.

Take of fresh orange peel two pounds. Add so much water that, when ten pounds have been distilled off, there shall remain sufficient to prevent empyreuma. After due maceration distil ten pounds, to which add five ounces of diluted alcohol.

Aqua citri medicæ. Edinburgh.—Water of lemon peel, prepared in the same manner as the last.

Aqua cinnamomi. London. *Aqua lauræ cinnamomi.* Edinburgh.—Cinnamon water.

Take of bruised cinnamon bark a pound, or of oil of cinnamon by weight five scruples.

Macerate the oil or the bark in water for four-and-twenty hours, then add a sufficient quantity of water to prevent empyreuma after the distillation. Let a gallon be distilled.

Aqua lauri cassiæ. Edinburgh.—Water of Cassia bark. Prepared in the same manner as the last.

Aqua fœniculi. London.—Fennel water.

Take of fennel seeds bruised a pound. Pour on them a sufficient quantity of water to prevent empyreuma. Let a gallon be distilled.

Aqua menthæ piperitæ. London. Edinburgh.—Peppermint water.

Take of peppermint a pound and a half, or double the quantity of the fresh herb. Pour upon it so much water as will prevent empyreuma. Let a gallon be distilled.

Aqua menthæ viridis. London.—Spearmint water.

Take of spearmint a pound and a half, or double the quantity if the fresh herb be employed. Distil a gallon in the same manner as above.

Aqua pimentæ. London.—*Aqua myrti pimentæ.* Edinburgh.—Pimento water.

Take of pimento berries bruised half a pint, water a pint. Macerate the berries in the water for four-and-twenty hours, and distil a gallon (ten pounds, Edinburgh) in the same manner as above.

Aqua pulegii. London.—*Aqua menthæ pulegii.* Edinburgh.—Pennyroyal water

Take of pennyroyal a pound and a half, or double the quantity if the fresh herb be used. Distil a gallon (ten pints, Edinburgh) in the same manner as above.

Aqua rosæ. London.—*Aqua rosæ centifoliæ.* Edinburgh.—Rose water.

Take of the petals of the hundred leaved rose, eight pounds (six pounds, Edinburgh), let a gallon (ten pints, Edinburgh) be distilled as above.

Infusa.—Infusions.

'The substances which water without the aid of boiling can extract from vegetable matter submitted to its action are gum, mucus, extractive tannin, the bitter and narcotic principles, gum resin, volatile oil, acids, and alkalies, a range which includes most of the principles on which the medical properties of plants depend. These principles also are less liable to be altered by infusion than by decoction, and consequently this form of preparation is to be preferred in every instance to which it is applicable. The strength and quality of the infusions are varied by the degree of temperature of the water; those made with hot water being necessarily stronger, but particularly in the case of bitters; cold infusions are more grateful.

'Infusions, like decoctions, are liable to undergo spontaneous decomposition, if kept even for a few days, and therefore the London college has properly directed half a pint only to be made at one time, thus regarding them as extemporaneous prescriptions.' Thomson.

Infusum anthemidis. London.—*Infusum anthemidis nobilis.* Edinburgh.—Infusion of chamomile.

Take of chamomile flowers two drachms, boiling water half a pint. Macerate for ten minutes (twenty-four hours, Edinburgh) in a slightly covered vessel, and strain.

'This infusion precipitates solution of isinglass

whitish; infusion of yellow cinchona bark, white; solution of sulphate of iron, and of tincture of muriate of iron, black; solution of nitrate of silver, white; of oxymuriate of mercury, pale brown; and of acetate and superacetate of lead, yellowish-white. These substances, therefore, are incompatible in prescription with this infusion.'

Medical properties.—Stomachic and tonic. Dose from f. ℥j. to f. ℥ij.

Infusum armoraciæ compositum. London.—Compound infusion of horse radish.

Take of fresh horse radish root sliced, of mustard seed bruised, of each one ounce, boiling water a pint. Macerate for two hours in a slightly covered vessel, and strain; then add one fluid ounce of compound spirit of horse radish.

'This infusion precipitates infusion of galls, yellowish, and infusion of yellow cinchona bark, white. The solutions of the pure alkalies do not affect it, but with their carbonates whitish precipitates are produced, as is also the case with solution of oxymuriate of mercury; while nitrate of silver produces a precipitate of a brown color. Hence all those substances, except the pure alkalies, are incompatible in formulæ with this infusion.'

Medical properties.—Stimulant. Useful in paralysis. Dose from f. ℥j. to f. ℥iij.

Infusum aurantii compositum. London.—Compound infusion of orange peel.

Take of dried orange peel two drachms, fresh lemon peel one drachm, bruised cloves half a drachm, boiling water half a pint. Macerate for fifteen minutes in a vessel lightly covered, and strain.

'This infusion precipitates sulphate of iron, black; and also produces precipitates with superacetate of lead, infusion of yellow cinchona bark, and lime water.'

Medical properties.—Stomachic. Dose f. ℥iß.

Infusum calumbæ. London. *Infusum colombæ.* Edinburgh.—Infusion of calumba.

Take of calumba root sliced one drachm, boiling water half a pint. Macerate in a slightly covered vessel for two hours, and strain.

'This affords precipitates with infusion of yellow cinchona bark, lime-water, and solution of oxymuriate of mercury.'

Medical properties.—Stomachic. Dose f. ℥iß.

Infusum caryophyllorum. London. — Infusion of cloves.

Take of bruised cloves a drachm, boiling water half a pint. Macerate for two hours in a lightly covered vessel, and strain.

'This affords precipitates with infusion of yellow cinchona bark, the strong acids, and lime-water. Solution also of sulphate of iron occasions a copious black precipitate; sulphate of zinc, superacetate of lead, and nitrate of silver, brown precipitates. It also decomposes tartarised antimony.'

Medical properties.—A warm stomachic. Dose f. ℥iß.

Infusum cascarillæ. London.—Infusion of cascarilla.

Take of cascarilla bruised half an ounce, boiling water half a pint. Macerate for two hours in a vessel lightly covered, and strain.

'This is incompatible in formulæ with the following substances, which it precipitates: lime-water, infusion of galls, infusion of yellow cinchona bark, solution of nitrate of silver, acetate and superacetate of lead, sulphate of zinc, and sulphate of iron, which is slowly thrown down of a pale olive color.'

Medical properties.—Tonic, stimulant, and perhaps expectorant. Dose f. ℥iß.

Infusum catechu compositum. London.—Compound infusion of catechu.

Take of extract of catechu two drachms and a half, bruised cinnamon bark half a drachm, boiling water half a pint. Macerate for an hour in a vessel lightly covered, and then strain.

Infusum acaciæ catechu. Edinburgh.—Infusion of catechu.

Take of extract of catechu pulverised two drachms and a half, cinnamon bark bruised half a drachm, boiling water seven ounces, simple syrup one ounce. Macerate the extract and the bark with the water for two hours, in a covered vessel; then strain and add the syrup.

'The following substances precipitate the tannin of this infusion or otherwise alter its properties, and therefore ought not to be ordered in formulæ with it:—Solution of isinglass, infusion of yellow cinchona bark, the strong acids, sulphate of iron, sulphate of zinc, oxymuriate of mercury, tartarised antimony, and superacetate of lead.'

Medical properties.—Astringent. Dose f. ℥iß.

Infusum cinchonæ. London.—Infusion of cinchona bark.

Take of lanced-leaved cinchona bark bruised half an ounce, boiling water half a pint. Macerate for two hours in a lightly covered vessel, and strain.

Infusum cinchonæ lancifoliæ. Edinburgh.—Infusion of cinchona.

Take of cinchona bark bruised one ounce, water one pound. Macerate for twenty-four hours, agitating frequently, and strain.

'These infusions afford precipitates with the following substances: the strong acids, the alkaline carbonates, lime-water, solutions of sulphate of iron, sulphate of zinc, nitrate of silver, oxymuriate of mercury, oxide of arsenic, subcarbonate of potassa, and tartarised antimony; the aqueous infusions and decoctions of chamomile flowers, calumba, cascarilla, horse-radish, cloves, catechu, orange peel, foxglove, senna, rhubarb, valerian, simaruba, and elm-bark.'

Medical properties.—Tonic. Dose f. ℥iß.

Infusum cuspariæ. London.—Infusion of cusparia.

Take of cusparia bark bruised two drachms, boiling water half a pint. Macerate for two hours in a lightly covered vessel, and strain.

'The solution of sulphate of iron throws down a greenish-yellow precipitate, and sulphate of zinc a yellowish one; nitrate of silver, oxymuriate of mercury, superacetate of lead, infusions of galls and of catechu, also produce precipitates in it. Tartarised antimony is slowly decomposed, and therefore cannot properly be ordered in formulæ with this infusion.'

Medical properties.—Tonic and stimulant. Dose f. ℥iß.

Infusum digitalis. London.—Infusion of foxglove.

Take of the dried leaves of foxglove a drachm, boiling water half a pint. Macerate in a lightly covered vessel for two hours, and strain; then add of spirit of cinnamon half a fluid ounce.

Infusum digitalis purpureæ. Edinburgh.—Infusion of foxglove.

Take of dried foxglove leaves one drachm, boiling water eight ounces, spirit of cinnamon one ounce. Macerate the leaves with the water during two hours in a vessel lightly covered; then, the spirit being added, strain.

'The solution of sulphate of iron slowly throws down a pale precipitate from these infusions; superacetate of lead, and infusion or decoction of yellow cinchona bark, produce instantaneous and copious precipitates.'

Medical properties.—Diuretic, &c. Dose from f. ℨij. to f. ℥j.

Infusum gentianæ compositum. London.—Compound infusion of gentian.

Take of gentian root sliced, orange peel dried of each a drachm, fresh lemon peel two drachms, boiling water twelve fluid ounces. Macerate for an hour in a vessel lightly covered, and strain.

Edinburgh.—Take of gentian root sliced half an ounce, dried orange peel bruised, coriander seeds bruised, of each a drachm, diluted alcohol four ounces, water one pound. First pour on the alcohol, and after three hours the water; then macerate for twelve hours without heat, and strain.

'The solution of acetate of lead throws down a copious precipitate in this infusion, and sulphate of iron strikes a brown color, but no precipitate takes place for twelve hours.'

Medical properties.—Tonic and stomachic. Dose f. ℥iß.

Infusum lini compositum. London.—Compound infusion of linseed.

Take of linseed bruised one ounce, liquorice root sliced half an ounce, boiling water two pints. Macerate for four hours in a vessel lightly covered, and strain. Let the vessel stand near the fire.

Infusum lini usitatissimi. Edinburgh.—Infusion of linseed.

Take of linseed an ounce, bruised liquorice root two drachms, boiling water two pounds. Digest during four hours in a lightly covered vessel, and strain.

'This infusion is a solution of mucus nearly in its pure state. It is clear, colorless, inodorous, and nearly insipid. Alcohol precipitates the mucus in white flocculi, and precipitates are also produced by subacetate and acetate of lead, and the tincture of muriated iron; hence these substances are incompatible in formulæ with this infusion.'

Medical properties.—Demulcent. Dose f. ℥ij.

Infusum quassiæ. London.—Infusion of quassia.

Take of quassia wood, chipped, a scruple, boiling water half a pint. Macerate for two hours in a lightly covered vessel, and strain.

Infusum quassiæ excelsæ. Edinburgh.—Infusion of quassia.

Take of quassia wood, rasped, half a drachm, boiling water eight ounces. Macerate in a lightly covered vessel for two hours, and strain.

'These infusions are not altered by any of the substances usually employed as adjuncts to bitters, and by two only of the metallic salts. Nitrate of silver slowly throws down soft yellow flakes, and acetate of lead a white precipitate.'

Medical properties.—Tonic. Dose f. ℥iß.

Infusum rhæi. London.—Infusion of rhubarb.

Take of rhubarb, sliced, a drachm, boiling water half a pint. Macerate for two hours in a vessel lightly covered, and strain.

Edinburgh.—Take of rhubarb root, bruised, half an ounce, boiling water eight ounces, spirit of cinnamon one ounce. Macerate the root with the water in a covered vessel during twelve hours; then add the spirit, and strain.

'The following substances either occasion precipitates in these infusions, or otherwise alter their properties, and are therefore incompatible in formulæ with them: the strong acids and lime-water, solutions of sulphate of iron, sulphate of zinc, nitrate of silver, oxymuriate of mercury, acetate of lead, tartarised antimony, and infusions of catechu, cinchona, and cusparia.'

Medical properties.—Tonic and aperient. Dose of the London formula from f.℥j to f. ℥iij, half the quantity of the Edinburgh.

Infusum rosæ compositum. London.—Compound infusion of roses.

Take of the dried petals of the red rose half an ounce, boiling water two pints and a half, diluted sulphuric acid three fluid drachms, double refined sugar an ounce and a half. Pour the water on the rose petals in a covered glass vessel; then drop in the acid, and macerate for half an hour; lastly, strain the liquor and add the sugar.

Infusum rosæ gallicæ. Edinburgh.—Infusion of the red rose.

Take of the dried petals of the red rose one ounce, boiling water two pounds and a half, sulphuric acid diluted half an ounce, refined sugar one ounce. Macerate the petals with the water in an earthen vessel which has not been glazed with lead for four hours; then pour in the acid, strain the liquor, and add the sugar.

'The incompatible substances with these infusions are those which are decomposed by the sulphuric acid. The sulphates of iron and zinc, although they do not immediately alter it, yet slowly produce dark-colored precipitates after some hours.'

Medical properties.—Refrigerant and astringent. Dose f. ℥iß.

Infusum sennæ compositum. London.—Compound infusion of senna.

Take of senna leaves an ounce and a half, ginger root sliced a drachm, boiling water a pint. Macerate during an hour in a lightly covered vessel, and strain the liquor.

Infusum cassiæ sennæ. Edinburgh.—Infusion of senna.

Take of senna leaves six drachms, ginger root bruised a scruple, boiling water nine ounces. Macerate in a lightly covered vessel for an hour, and strain.

'These infusions are precipitated by the strong acids, the alkaline carbonates, lime-water. solutions of nitrate of silver, oxymuriate of mercury, superacetate of lead, tartarised antimony,

and infusion of yellow cinchona bark, which are consequently incompatible in formulæ with them.'

Medical properties.—Aperient. Dose, when given alone, from f. ℥iij. to f. ℥iv.

Infusum sennæ compositum. Edinburgh.—Infusion of tamarinds and senna.

Take of preserved tamarinds one ounce, senna leaves one drachm, coriander seeds bruised half a drachm, raw sugar half an ounce, boiling water eight ounces. Macerate in a covered earthen vessel which is not glazed with lead, frequently shaking, and at the end of two hours strain.

Tamarinds considerably cover the nauseous flavor of the senna.

Infusum simaroubæ. London.—Infusion of Simaruba.

Take of Simaruba bark bruised half a drachm, boiling water half a pint. Macerate for two hours in a lightly covered vessel and strain.

'The alkaline carbonates and lime water render this infusion milky, and the following substances occasion precipitates. Nitrate of silver, oxymuriate of mercury, superacetate of lead, infusion of galls, catechu, and yellow cinchona bark.'

Medical properties. Tonic and antidysenteric. Dose f. ℥iß

Infusum tabaci. London.—Infusion of tobacco.

Take of tobacco leaves a drachm, boiling water a pint. Macerate in a lightly covered vessel during an hour and strain.

Medical properties. Used as an enema in strangulated hernia, in ileus and other obstinate derangements of the bowels.

Mucilagines.—Mucilages.

In pharmacy mucilage implies, as well as a simple solution of gum or mucus in water, any solution of a thick and adhesive nature resembling in its appearance the solutions of gum.

Mucilago acaciæ. London.—Mucilage of acacia.

Take of acacia gum in powder four ounces, boiling water half a pint. Rub the gum with the water gradually adding the latter until a mucilage be formed.

Mucilago acaciæ arabicæ. Edinburgh.—Mucilage of gum arabic.

Take of gum arabic in powder one part, boiling water two parts. Digest with occasional agitation until the gum be dissolved; then strain the mucilage through linen.

'The strong acids act on mucilage as they do on gum, but when diluted they do not alter mucilage. Alcohol converts it into a white curd, but proof spirit produces scarcely any alteration; no change is produced by spirit of nitric ether, but sulphuric ether, and compound spirit of ether, precipitate a thick, white, tenacious curd. Tincture of muriate of iron, even when diluted, converts mucilage into a brownish or orange-colored insoluble jelly; and subacetate of lead gives a copious, dense, flaky, precipitate, which is a compound of gum and oxide of lead, while no change is produced by the following metallic substances: superacetate of lead, green sulphate of iron, sulphate of zinc, oxymuriate of mercury, and tartarised antimony; nor by the alkalies, or the neutral salts.'

Medical properties.—Demulcent. Dose from f. ℥ß. to ℥iß.

Mucilago astragali tragacanthæ. Edinburgh.—Mucilage of tragacanth.

Take of gum tragacanth in powder two drachms, boiling water eight ounces. Macerate for four-and-twenty hours, and triturate the gum carefully that it may be dissolved; then strain the mucilage through linen.

Medical properties—The same as the acacia.

Mucilago amyli. London. Edinburgh. Mucilage of starch.

Take of starch three drachms, water a pint. Rub the starch, gradually adding the water; then boil until a mucilage be formed.

Medical properties.—Demulcent. It is a common and good vehicle for giving anodynes in enemata.

Decocta.—Decoctions.

Decoctum aloes compositum. London.—Compound decoction of aloes.

Take of extract of liquorice half an ounce; subcarbonate of potassa two scruples; powdered extract of spiked aloes, powdered myrrh, and saffron, of each a drachm: water a pint. Boil down to twelve fluid ounces; then add compound tincture of cardamoms four fluid ounces.

'This decoction is decomposed by all the strong acids; corrosive muriate of mercury produces a pale brown precipitate; while tartarised antimony, sulphate of zinc, and superacetate of lead produce white curdy precipitates.'

Medical properties.—Cathartic and emmenagogue. It is somewhat similar to the well known beaume de vie. Dose from f. ℥ß. to f. ℥ij.

Decoctum althææ compositum. Edinburgh.—Decoction of marsh mallows.

Take of marsh mallow root dried and bruised four ounces, raisins stoned two ounces, water seven pounds. Boil down to five pounds. Set aside the strained liquor, and when the dregs have subsided decant it.

Medical properties.—Demulcent. Dose ad libitum.

Decoctum anthemidis nobilis. Ediuburgh.—Decoction of chamomile.

Take of chamomile flowers dried one ounce, carraway seeds bruised half an ounce, water five pounds. Boil during a quarter of an hour, and strain.

Decoctum cinchonæ. London.—Decoction of cinchona bark.

Take of lance-leaved cinchona bark bruised an ounce, water a pint. Boil for ten minutes in a vessel lightly covered, and strain the liquor while it is hot.

Decoctum cinchonæ lancifoliæ. Edinburgh.—Decoction of lance-leaved cinchona bark.

Take of cinchona bark in powder one ounce, water one pound and a half. Boil during ten minutes in a covered vessel, and strain the liquor while it is hot.

For *medical properties*, and incompatibles, see infusion of cinchona.

Decoctum cydoniæ. London.—Decoction of quince seeds.

Take of quince seeds two drachms, water a pint. Boil them over a gentle fire during ten minutes; then strain.

'This is coagulated by alcohol, acids, and most of the metallic salts, which therefore are incompatible in formulæ with it: it must be used as soon as it is made.'

Medical properties.—Demulcent: ad libitum.

Decoctum daphnes mezerii. Edinburgh.—Decoction of mezereon.

Take of the bark of mezereon root two drachms, liquorice root bruised half an ounce, water three pounds. Boil down to two pounds with a gentle heat, and strain.

Medical properties.—Alterative. It has been employed in old syphilitic affections, and in chronic rheumatism; and in several forms of cutaneous disorder.

Decoctum dulcamaræ. London.—Decoction of woody nightshade.

Take of the stalks of woody nightshade sliced one ounce, water a pint and a half. Boil down to a pint, and strain.

Medical properties.—Diuretic and narcotic. It has been used in some chronic disorders of the skin. Dose f. ℥ß to f. ℥i.

Decoctum Geoffroyæ inermis. Edinburgh—Decoction of cabbage-tree bark.

Take of cabbage-tree bark in powder one ounce, water two pounds. Boil with a gentle heat down to one pound, and strain.

Not much used in this country.

Decoctum guiaiaci compositum. Edinburgh.—Compound decoction of guaiacum.

Take of guaiacum wood rasped three ounces; raisins two ounces; sliced sassafras root, bruised liquorice root, of each one ounce; water ten pounds. Boil the guaiacum wood and the raisins in the water over a gentle fire to five pounds, adding the roots towards the end of the boiling; then strain.

Medical properties.—Alterative and antirheumatic. Dose f. ℥iv. to f. ℥viij.

Decoctum hordei. London, (distichi, Edinburgh).—Decoction of barley.

Take of pearl barley two ounces, water four pints and a half (five pounds Edinburgh). First wash any extraneous substances away that may be adhering to the barley; then, having poured on it half a pint of water, boil for a few minutes. This water being thrown away, let the remainder be added boiling; then boil it to two pints and strain.

Decoctum hordei compositum. London.—Compound decoction of barley.

Take of decoction of barley two pints, figs sliced two ounces, liquorice root sliced and bruised half an ounce, raisins stoned two ounces, water a pint. Boil to two pints, and strain.

Medical properties.—Demulcent: ad libitum.

Decoctum lichinis. London (Islandici, Edinburgh).—Decoction of liverwort.

Take of liverwort one ounce, water a pint and a half (two pounds Edinburgh). Boil to a pint, and strain.

Medical properties.—Demulcent and tonic. Dose from f. ℥ij. to f. ℥iij.

Decoctum malvæ compositum. London.—Compound decoction of mallows.

Take of mallows dried an ounce, chamomile-flowers dried half an ounce, water a pint. Boil during a quarter of an hour, and strain.

Medical properties.—Demulcent. Used for fomentations and enemas.

Decoctum papaveris. London.—Decoction of poppy.

Take of the white poppy capsules bruised four ounces, water four pints. Boil for a quarter of an hour, and strain.

Medical properties.—Anodyne. Used for fomentations.

Decoctum quercûs. London (roboris, Edinburgh).—Decoction of oak bark.

Take of oak bark one ounce, water two pints (two pounds and a half Edinburgh). Boil to a pint, and strain.

'This decoction is precipitated by solutions of isinglass, infusion of yellow cinchona bark, the carbonates of the alkalies, the aromatic spirit of ammonia, lime-water, and solutions of sulphate of iron, acetate of lead, oxymuriate of mercury, and sulphate of zinc, which are therefore incompatible in formulæ with it.'

Medical properties.—Astringent and tonic. It is useful as a gargle in cases of relaxed tonsils or uvula, and as a wash in procidentia ani et uteri.

Decoctum sarsaparillæ. London.—Decoction of sarsaparilla.

Take of sarsaparilla root sliced four ounces, boiling water four pints. Macerate during four hours in a vessel lightly covered and placed near the fire; then take the sarsaparilla out and bruise it. Return it to the liquor and macerate in the same way for two more hours; then boil it down to two pints, and strain.

Decoctum smilaris sarsaparillæ. Edinburgh.—Decoction of sarsaparilla.

Take of sarsaparilla sliced six ounces, water eight pounds. Digest during two hours in a temperature of about 195°; then take the root out and bruise it; in this state return it to the liquor, and boil down to two pounds, over a gentle fire; then express and strain.

'These bruisings and macerations,' Dr. Thomson tells us, 'are rather worse than superfluous. The entire root, merely bruised and macerated in water at 180° of Fahrenheit, will yield up all its medicinal properties. It affords precipitates with lime-water, solution of muriate of barytes and of acetate of lead, which are therefore incompatible in formulæ with it.'

Decoctum sarsaparillæ compositum. London.—Compound decoction of sarsaparilla.

Take of sarsaparilla decoction boiling four pints; sassafras root sliced, guaiacum root rasped, liquorice root bruised, of each an ounce; bark of mezereon root three drachms. Boil for a quarter of an hour; then strain.

Medical properties.—Sarsaparilla decoction is employed as an alterative and an adjunct to mercury. The compound decoction is likewise used for the same purpose, as well as for several cutaneous disorders and rheumatic affections. Dose f. ℥iv.

Decoctum senegæ. London.—*Decoctum polygalæ senegæ.* Edinburgh.—Decoction of seneka.

Take of seneka root an ounce, water two pints

Boil to a pint, and strain. Dose f. ℥iß. to f. ℥iij. See MATERIA MEDICA,

Decoctum veratri. London.—Decoction of white hellebore.

Take of white hellebore root bruised one ounce, water two pints, rectified spirit two fluid ounces. *Boil the root with the water down to a pint, and strain; then, when the decoction is cold, let the spirit be added.*

Medical properties.—Principally employed as a lotion in cutaneous eruptions.

EXTRACTA.—Extracts.

These are preparations obtained by evaporating solutions of vegetable matter to the consistence of a firm mass. The London college gives the following directions respecting them:—

'In preparing all kinds of extracts evaporate the fluid as quickly as possible in a broad shallow dish, placed in a water-bath, until the extract acquire a consistence proper for forming pills, and towards the end of the operation stir assiduously with a spatula.

'Sprinkle a small quantity of rectified spirit upon all the softer extracts.'

Extractum aconiti. London.—Extract of aconite or wolfsbane.

Take of the fresh leaves of aconite a pound. Bruise them in a stone mortar, sprinkling over them a little water; then express the juice, and without any depuration, let the water be evaporated so that a mass is left of proper consistence.

Succus spissatus aconiti napelli. Edinburgh.—Inspissated juice of aconite.

Let the fresh leaves of aconite be bruised, and enclosed in a hempen bag; press them strongly until they yield their juice which is to be evaporated in flat vessels, heated with boiling water, saturated with common salt, and immediately reduced to the consistence of thick honey.

Medical properties.—See MATERIA MEDICA. Dose half a grain gradually increased to grs. iv. or grs. v.

Extractum aloes purificatum. London.—Extract of aloes.

Take of extract of spiked aloes powdered a pound, boiling water a gallon. Macerate for three days in a gentle heat; then strain the solution and set it aside for the dregs to subside. Pour off the clear liquor and evaporate to a due consistence.

An unnecessary preparation. Dose from gr. x. to gr. xv.

Extractum anthemidis. London.—*Extractum anthemidis nobilis.* Edinburgh.—Extract of chamomile.

Take of chamomile flowers dried a pound, water a gallon. Boil down to four pints and strain the liquor while it is hot; then evaporate to a due consistence.

The aroma and volatile oil are dissipated, and very little more than a simple bitter left by this process. Dose ℈ß. to ℈j.

Extractum belladonnæ. London.—*Succus spissatus atropæ belladonnæ.* Edinburgh.—Extract of belladonna.

Take of fresh leaves of belladonna a pound. Bruise them in a stone mortar, sprinkl..., over them a little water; then express the juice, and without any separation of the sediment let it be evaporated to a due consistence.

Medical properties.—Antispasmodic and sedative. Dose from gr. i. very gradually increased to grs. v. It requires great caution in its administration. As a remedy for hooping cough in conjunction with soda Dr. Thomson speaks *highly of it.*

Extractum cinchonæ. London.—Extract of cinchona bark.

Take of lanced-leaved cinchona bark bruised a pound, water a gallon. Boil to six pints and strain the liquor while it is warm. Boil it down again in the same manner for four times in succession in an equal quantity of water, and strain. Lastly, mix the solutions together, and evaporate the mixture to a due consistence.

This extract ought to be kept in a soft state proper for making pills, and in a hard state for reduction to powder. Dose from ℈ß to ʒß.

Extractum cinchonæ resinosum. London.—Resinous extract of bark.

Take of lanced-leaved cinchona bark bruised a pound, rectified spirits four pints. Macerate during four days, and strain. Let the tincture be distilled in a water-bath until the extract have acquired a proper consistence.

Extractum cinchonæ lancifoliæ. Edinburgh.—Extract of officinal cinchona bark.

Take of lance-leaved cinchona bark in powder one pound, alcohol four pounds. Digest fo four days, and pour off the tincture. Boil the residue in five pounds of distilled water for fifteen minutes, and strain the decoction while it is hot through a linen cloth. Repeat this boiling with an equal quantity of distilled water, strain again, and evaporate the liquor to the consistence of thin honey. Distil the alcohol from the tincture until it be reduced to a similar consistence. Then mix the inspissated liquors, and evaporate them to a proper consistence in a bath of boiling water, saturated with muriate of soda.

These are preferable preparations to the watery extracts, as the active principles of the bark are better taken up by the separate action of the water and spirits than by water alone. Dose from ℈ß. to ʒß.

Extractum colocynthidis. London.—Extract of colocynth.

Take of the pulp of colocynth a pound, water a gallon. Boil down to four pints and strain the liquor while it is hot; then evaporate to a proper consistence.

Medical properties.—A mild purgative. Dose from ℈ß. to ʒß.

Extractum colocynthidis compositum. London.—Compound extract of colocynth.

Take of colocynth pulp sliced six ounces, extract of the spiked aloe powdered twelve ounces, scammony powdered four ounces, cardamom seeds powdered one ounce, hard soap three ounces, proof spirit one gallon. Let the colocynth pulp be macerated in the spirit, with a gentle heat for four days. Strain the liquor, and add the scammony, the aloes, and the soap; then evaporate it to a due consistence, and towards the end of the inspissation mix in the cardamom seeds.

Medical properties.—Combined with calomel

an excellent purgative. Dose from ℈ß. to ʒß.

Extractum conii. London.—*Succus spissatus conii maculati.* Edinburgh,—Extract of hemlock.

Take of fresh hemlock a pound. Bruise it in a stone mortar, sprinkling a little water over it; then express the juice, and without separating the sediment evaporate to a proper consistence.

Medical properties.—The same as the powder. See MATERIA MEDICA. Dose gr. ii. gradually increased to ℈j.

Extractum elaterii. London.—Extract of elaterium.

Slice ripe cucumbers, express the juice very gently, and pass it through a very fine hair sieve into a glass vessel; then put it aside for some hours until the thicker part has subsided; reject the thinner supernatant part, and let the thicker part be dried with a gentle heat.

This process gives the fæcula of the plant, combined with elaterium, which, according to the experiments of Dr. Clutterbuck, is only contained in the proportion of six grains to forty of the plant, so that the pure elaterium would be very much stronger than this improperly called extract of elaterium.

Medical properties.—A most powerful and useful hydragogue. Dose from a quarter of a grain to gr. ij.

Extractum gentianæ. London.—Extract of gentian.

Take of gentian root sliced a pound, boiling water a gallon. Macerate during twenty-four hours; then boil down to four pints; let the liquor be strained while it is hot, and evaporated to a proper consistence.

Extractum gentianæ luteæ. Edinburgh.—Extract of gentian.

Take of gentian root any quantity. Having sliced and bruised it, pour eight times its weight of boiling water upon it. Boil down to one-half, express the liquor strongly, and strain it. Evaporate the decoction immediately to the consistence of thick honey in a bath of boiling water, saturated with common salt. Dose from ℈ß. to ʒß.

Extractum glycyrrhizæ. London.—Extract of liquorice.

Take of liquorice root sliced a pound, boiling water a gallon. Macerate for twenty-four hour; then boil down to four pints; let the hot solution be strained, and then evaporate to a due consistence.

What is called the refined liquorice of the shops is the impure extract of commerce dissolved and strained.

Extractum hæmatoxyli. London.—*Extractum hæmatoxyli campechianæ.* Edinburgh.—Extract of logwood.

Take of logwood rasped a pound, boiling water a gallon. Macerate for twenty-four hours; then boil to four pints, strain the hot liquor and then evaporate to a proper consistence. Dose from ℈ß. to ʒß.

Extractum radicis hellebori nigri. Edinburgh.—Extract of black hellebore root.

Prepare in the same manner as the extract of gentian.

Extractum humuli. London.—Extract of hop.

Take of the strobiles of hop four ounces, water a gallon. Boil to four pints, strain the hot liquor, and evaporate to a due consistence. Dose from ℈ß. to ℈j.

Extractum hyoscyami. London.—*Succus spissatus hyoscyami nigri.* Edinburgh.—Extract of henbane.

Take of fresh leaves of henbane a pound. Bruise them in a stone mortar, sprinkling a little water on them; then press out the juice, and without separating the sediment evaporate to a due consistence.

Medical properties.—A substitute for opium when it is desirable to avoid costiveness. Dose from gr. ij. gradually increased to ℈j.

Extractum jalapæ. London.—Extract of jalap.

Take of jalap root powdered a pound, rectified spirit four pints, water one gallon. Macerate the root in the spirit for four days, and decant the tincture. Boil the residue in the water to two pints. Then strain the tincture and decoction separately; distil the former and evaporate the latter until both begin to thicken. Lastly, mix the extract with the resin, and evaporate the liquor to a due consistence.

This extract should be preserved in a soft state fit for forming pills, and in a hard state so that it may be reduced to powder.

Extractum convolvulæ jalapæ. Edinburgh.—Extract of jalap.

This is ordered to be prepared in the same manner as the extract of cinchona. Dose from ℈ß, to ʒß.

Extractum lactucæ. London.—Extract of lettuce.

Take of fresh lettuce leaves one pound. Bruise them in a stone mortar, sprinkling over them a little water; then express the juice and evaporate it unstrained, until it acquire a due consistence.

Succus spissatus lactucæ sativæ. Edinburgh.—Inspissated juice of garden lettuce.

Succus spissatus lactucæ virosæ. Edinburgh.—Inspissated juice of the wild lettuce.

To be prepared as other inspissated juices.

Medical properties.—Substitutes for opium. Dose gr. vj. increased.

Extractum opii. London.—Extract of opium.

Take of opium sliced sixteen ounces, water one gallon. Pour upon the opium a small quantity of the water and macerate for twelve hours that it may become soft; then, gradually adding the remaining water, rub them together until they be well mixed, and set the mixture apart for the fæculencies to subside. Lastly, strain the liquor and evaporate to a due consistence. This watery solution contains less of the resinous than the gummy part of the drug, and also 'contains more of morphia on which depends the remedial quality of opium.'

Its incompatibles are 'solutions of astringent vegetables, the alkaline carbonates, corrosive muriate of mercury, sulphate of copper, sulphate of zinc, acetate of lead, and nitrate of silver.'

Medical properties.—It is said to possess the virtues without the deranging influence of opium. Dose from gr. i. to gr. v.

Extractum papaveris. London.—*Extractum papaveris somniferi.* Edinburgh.—Extract of poppies.

Take of the capsules of the poppy, freed from the seeds and bruised, a pound; boiling water a gallon. Macerate during twenty-four hours, then boil to four pints; strain the liquor while hot, and let it be evaporated to a proper consistence.

Medical properties.—Less liable to affect the head or act deleteriously than opium is. Dose grs. iij. to grs. xij.

Extractum rhæi. London.—Extract of rhubarb.

Take of powdered rhubarb root a pound, proof spirit a pint, water seven pints. Macerate in a gentle heat during four days; then strain the solution, and set it apart for the subsiding of the fæculencies. Pour off the clear liquor, and evaporate it to a due consistence. An objectionable preparation. Dose grs. x. to ℈ß.

Extractum rutæ graveolentis. Edinburgh.—Extract of rue.

To be prepared in the same manner as the gentian extract.

Medical properties.—Very little more than a mere bitter. Dose from grs. xv. to ℈ß.

Succus spissatus sambuci nigræ. Edinburgh.—The inspissated juice of the black elder.

Take of the ripe berries of the black elder five parts; purified sugar one part. Boil with a gentle heat to the consistence of thick honey. An apparently useless preparation.

Extractum sarsaparillæ. London.—Extract of sarsaparilla.

Take of sliced sarsaparilla root a pound; boiling water a gallon. Macerate during twenty-four hours; then boil down to four pints; strain the solution while hot, and evaporate it to a due consistence.

'It appears from Mr. Pope's experiments that by submitting the root, cut transversely, to the action of steam or distilled water, at a temperature somewhat below boiling, an elegant soluble extract may be obtained, containing all the virtues of the plant, not liable to decomposition, and applicable to the various purposes of extemporaneous prescription; whilst by the method ordered in the above formula of the college an insoluble inefficacious extract only is obtained' —Thomson. Dose from ℈ß. to ʒj.

Extractum stramonii. London.—Extract of thorn-apple.

Take of the seeds of thorn apple one pound, boiling water one gallon. Macerate during four hours in a covered vessel near the fire, then take out the seeds, bruise them in a stone mortar, and put them again into the liquor. Lastly, evaporate until the mass become of a due consistence.

Medical properties.—Narcotic, and antispasmodic. Dose from gr. ß. to grs. ij. Particularly applicable to spasmodic asthma.

Extractum taraxaci. London.—Extract of dandelion.

Take of fresh dandelion root bruised a pound, boiling water a gallon. Macerate during twenty-four hours; then boil down to four pints, strain the liquor while hot, and evaporate it to a due consistence.

Medical properties.—Deobstruent. Useful in chronic obstructions of the liver. Dose from ℈ß. to ʒj.

MISTURÆ.—Mixtures.

These, in the London college, include what used to be called emulsions. They are to be formed extemporaneously.

Mistura ammoniaci. London.—Mixture of ammoniacum.

Take of ammoniacum two drachms; water half a pint. Triturate the ammonia gradually, adding the water until a union be thoroughly formed.

This preparation 'is coagulated by distilled vinegar, the oxymels, ether, spirit of nitric ether, supertartrate of potassa, and oxymuriate of mercury; which are, therefore, incompatible in prescription with mixture of ammoniacum.'

Medical properties.—Expectorant. Dose from f. ℥ß. to f. ℥j.

Mistura amygdalarum. London.—Almond mixture.

Take of almond confection two ounces, distilled water a pint. Add the water gradually to the almond confection during trituration, and then strain.

Emulsio amygdalæ communis. Edinburgh.—Almond emulsion.

Take of sweet almonds an ounce; refined sugar half an ounce; water two pounds and a half. Let the blanched almonds be beaten diligently in a stone mortar, and the water added gradually; then strain.

Emulsio acaciæ arabicæ. Edinburgh.—Emulsion of gum arabic.

Take of mucilage of gum arabic two ounces, almonds one ounce, refined sugar half an ounce, water two pounds and a half. Blanch the almonds, and then let them be beaten in a stone mortar with the sugar and the mucilage, gradually adding the water. Then strain through linen.

'These emulsions are decomposed by acids, oxymel and syrup of squills, spirits and tinctures (unless these be in small quantities), tartrate and supertartrate of potassa, supersulphate of potassa, nitrate of potassa, oxymuriate of mercury, acetate of lead, and spirit of nitric ether, which are therefore incompatible in prescriptions with almond emulsions.'

Medical properties.—Demulcent and diluent. Dose f. ℥ij.

Mistura assafœtidæ.—Mixture of assafœtida.

Take of assafœtida two drachms, water half a pint. Triturate the assafœtida, adding gradually the water to it until a thorough union be formed.

Medical properties.—Antispasmodic. Used principally in enemas. Dose when taken into the stomach from f. ℥ß. to f. ℥iß.

Mistura camphoræ. London.—Mixture of camphor.

Take of camphor half a drachm, rectified spirits ten minims; water a pint. Rub the camphor with the spirit first, then gradually add the water; strain. Dose from f. ℥ß. to ℥ij.

Emulsio camphoræ. Edinburgh.—Camphor emulsion.

Take of camphor a scruple; sweet almonds blanched, refined sugar, of each half an ounce; water a pint and a half. To be made in the same manner as the common almond emulsion.

A more powerful, and therefore better preparation than that of the London college. Dose from f. ℥ß. to f. ℥ij.

Mistura cornu usti. London.—Mixture of burnt hartshorn.

Take of burnt hartshorn two ounces; acacia gum, in powder, one ounce; water three pints. Boil down to two pints, continually stirring, and strain. A useless preparation.

Mistura cretæ. London.—Mixture of chalk.

Take of prepared chalk half an ounce; refined sugar three drachms; acacia gum, in powder, half an ounce; water a pint. Mix by triturating.

Potio carbonatis calcis. Edinburgh.—Chalk potion.

Take of prepared carbonate of lime (chalk) one ounce, refined sugar half an ounce, mucilage of gum arabic two ounces. Rub them together, gradually adding of water two pounds and a half, spirit of cinnamon two ounces. Mix.

Medical properties.—Antacid, and astringent. Dose from f. ℥j. to f. ℥ij.

Mistura ferri composita. London.—Compound mixture of iron.

Take of myrrh, powdered, a drachm; subcarbonate of potassa twenty-five grains; rose-water seven fluid ounces and a half; sulphate of iron, in powder, a scruple; spirit of nutmeg half a fluid ounce; refined sugar a drachm. Rub the myrrh, the subcarbonate of potassa, and the sugar together; and, during trituration, add first the rose-water and the spirit of nutmeg, and afterwards the sulphate of iron. Put the mixture immediately into a proper glass vessel, and keep it closely stopped.

In this preparation a sulphate of potassa is formed, and a subcarbonate of iron, the last of which is not dissolved, but merely diffused and suspended.

Medical properties.—Tonic and deobstruent. Dose from f. ℥ß to f. ℥ij.

Mistura guaiaci. London.—Mixture of guaiacum.

Take of guaiacum a drachm and a half, refined sugar two drachms, mucilage of gum acacia two fluid drachms, cinnamon water eight fluid ounces. Rub the guaiacum with the sugar, then with the mucilage, and while triturating gradually add the cinnamon water. Dose from ʒß to f. ʒij.

Mistura moschi. London.—Mixture of musk.

Take of musk, acacia gum in powder, refined sugar, of each a drachm; rose water six fluid ounces. Rub the musk first with the sugar, then with the gum, and gradually add the rose water.

Medical properties.—Antispasmodic, and stimulant. Dose from f. ℥ß. to f. ℥ij.

SPIRITUS.—Spirits.

Alcohol. London. See CHEMISTRY.

Spiritus ammoniæ. London.—Spirit of ammonia.

Take of rectified spirit three pints, muriate of ammonia four ounces, subcarbonate of potassa six ounces. Mix them, and distil with a gentle heat a pint and a half of spirit of ammonia into a receiver which is kept cold.

Alcohol ammoniatum. Edinburgh.—Ammoniated alcohol.

Take of alcohol thirty-two ounces, lime recently burnt twelve ounces, muriate of ammonia eight ounces, water six ounces. From these ammoniated alcohol is to be prepared precisely in the same manner as water of ammonia.

The decompositions in the above processes are sufficiently obvious.

Spiritus ammoniæ aromaticus. London.—Aromatic spirit of ammonia.

Take of bark of cinnamon bruised, cloves bruised, of each two drachms, lemon peel four ounces, subcarbonate of potassa half a pound, muriate of ammonia five ounces, rectified spirit four pints, water a gallon. Mix them, and distil over six pints.

Alcohol ammoniatum aromaticum. Edinburgh. —Aromatic ammoniated tincture.

Take of ammoniated alcohol eight ounces, volatile oil of rosemary a drachm and a half, volatite oil of lemons a drachm. Mix them so as that the oils shall be dissolved.

Medical properties.—Stimulant, and aromatic. Dose from f. ʒß to f. ʒj.

Spiritus ammoniæ fœtidus. London.—Fetid spirit of ammonia.

Take of spirit of ammonia two pints, assafætida two ounces. Macerate during twelve hours; then by a gentle fire distil over one pint and a half into a cold receiver.

Tinctura assafœtidæ ammoniata. Edinburgh.—Ammoniated tincture of assafœtida.

Take of ammoniated alcohol eight ounces, assafætida half an ounce. Digest in a close vessel during twelve hours, then distil over eight ounces by the heat of boiling water.

Medical properties, and dose, the same as the preceding.

Spiritus ammoniæ succinatus. London. Succinated spirit of ammonia.

Take of mastich three drachms, alcohol nine fluid ounces, oil of lavender fourteen minims, oil of amber four minims, solution of ammonia ten fluid ounces. Macerate the mastich in the alcohol so as to dissolve it, and pour off the clear tincture; then add the other ingredients, and mix them by agitation.

Medical properties.—Stimulant and antispasmodic. Dose from ♏x. to f. ʒß. It has been successfully used as an antidote to the bite of the rattle snake.

Spiritus anisi. London.—Spirit of aniseed.

Take of bruised aniseeds half a pound, proof spirit a gallon, water sufficient to prevent empyreuma. Distil one gallon.

Medical properties.—Carminative. Dose from f. ʒj. to f. ℥ß.

Spiritus armoraciæ compositus. London.—Compound spirit of horse radish.

Take of fresh horse radish sliced, orange peel dried, of each a pound; nutmegs bruised half an ounce; proof spirit a gallon; water sufficient to prevent empyreuma. Macerate during twenty-four hours, and distil over a gallon by a gentle heat.

Medical properties.—Principally employed in dropsies. Dose f. ʒj. to f. ℥ß.

Spiritus camphoræ. London.—Spirit of camphor.

Take of camphor four ounces, rectified spirit two pints. Mix so as to dissolve the camphor.

Tincturæ camphoræ. Edinburgh.—Tincture of camphor.

Take of camphor one ounce, alcohol a pound. Mix so as to dissolve the camphor. It may be made with double or treble the quantity of camphor.

Medical properties.—Only fit for external use.

Spiritus carui. London.—Spirit of carraway.

Take of carraway seeds bruised a pound and a half, proof spirit a gallon, water sufficient to prevent empyreuma. Macerate during twenty-four hours; then distil over a gallon by a gentle fire.

Spiritus cari carui. Edinburgh.—Spirit of carraway.

Take of carraway seeds bruised half a pound, proof spirit nine pounds. Macerate in a close vessel during two days; then add water sufficient to prevent empyreuma, and distil over nine pounds.

Medical properties.—Carminative. Dose from f. ʒj. to f. ʒij.

Spiritus cinnamomi. London.—Spirit of cinnamon.

Take of oil of cinnamon by weight five scruples, rectified spirit four pints and a half. Add the spirit to the oil with the addition of so much water as will be sufficient to prevent empyreuma; then distil a gallon over by a slow fire.

Spiritus lauri cinnamomi. Edinburgh.—Spirit of cinnamon.

To be prepared in the same manner as the spirit of carraway: using a pound of cinnamon bark.

Medical properties.—Cardiac. Dose f. ʒj. to ʒij.

Spiritus colchici ammoniatus. London.—Ammoniated spirit of colchicum.

Take of colchicum seeds bruised two ounces, aromatic spirit of ammonia a pint. Macerate for fourteen days, and strain.

Medical properties.—Dr. Williams of Ipswich suggested the use of the seeds of colchicum as containing the virtues without the deleterious qualities of the plant. Others have questioned their power. Dose of this preparation f. ʒj.

Spiritus juniperi compositus. London. Edinburgh.—Compound spirit of juniper.

Take of juniper berries bruised a pound, carraway seeds bruised, fennel seeds bruised, of each an ounce and a half, proof spirit a gallon, water a sufficient quantity to prevent empyreuma. Macerate during twenty-four hours; then distil over a gallon by a gentle heat.

Medical properties.—Diuretic. Dose f. ʒj. to f. ℥ß.

Spiritus lavandulæ. London.—Spirit of lavender.

Take of fresh lavender flowers two pounds, rectified spirit a gallon, water sufficient to prevent empyreuma. Macerate during twenty-four hours; then distil over a gallon by a gentle heat.

Spiritus lavandulæ spicæ. Edinburgh.—Spirit of lavender.

Take of fresh flowers of lavender two pounds, alcohol eight pounds. Distil over seven pounds with the heat of a water-bath.

Principally employed as a perfume.

Spiritus lavandulæ compositus. London.—Compound spirit of lavender.

Take of spirit of lavender three pints, spirit of rosemary a pint, cinnamon bark bruised, nutmegs bruised, of each half an ounce, red saunders wood chipped one ounce. Macerate during fourteen days, and strain.

Edinburgh.—Take of spirit of lavender three pounds, spirit of rosemary one pound, cinchona bark bruised one ounce, nutmegs bruised two drachms, red saunders wood rasped three drachms. Macerate during seven days, and strain.

Medical properties.—Stimulant and aromatic. Dose from f. ʒß. to f. ʒij.

Spiritus menthæ piperitæ. London. Edinburgh. Spirit of peppermint.

Take of dried peppermint a pound and a half, proof spirit a gallon, water a sufficient quantity to prevent empyreuma. Macerate during twenty-four hours; then distil over a gallon by a gentle heat.

Medical properties.—Carminative. Dose f. ʒß. to f. ʒij.

Spiritus menthæ viridis. London.—Spirit of spearmint.

Take of spearmint dried a pound and a half, proof spirit a gallon, water sufficient to prevent empyreuma. Macerate during twenty-four hours; then by a gentle heat distil over a gallon.

Medical properties.—Like the last.

Spiritus myristicæ. London.—*Spiritus myristicæ moschatæ.* Edinburgh.—Spirit of nutmeg.

Take of nutmegs bruised two ounces, proof spirit a gallon, water sufficient to prevent empyreuma. Macerate during twenty-four hours; then distil a gallon by a gentle heat.

Spiritus pimentæ. London.—Spirit of pimento.

Take of pimento berries bruised two ounces, proof spirit a gallon, water a sufficient quantity to prevent empyreuma. Macerate during twenty-four hours; then by a gentle heat distil over a gallon.

Spiritus myrti pimentæ. Edinburgh. Spirit of pimenta.

To be prepared with half a pound of bruised pimento berries in the same manner as the carraway spirit.

Medical properties.—Carminative. Dose f. ʒij.

Spiritus pulegii. London.—Spirit of pennyroyal.

Take of pennyroyal dried a pound and a half, proof spirit a gallon, water sufficient to prevent empyreuma. Macerate during twenty-four hours; then, by a gentle fire, distil over a gallon.

Medical properties.—Like spearmint.

Spiritus rosmarini. London.—Spirit of rosemary.

Take of fresh rosemary tops two pounds, proof spirit a gallon, water sufficient to prevent empyreuma. Macerate during twenty-four hours; then distil a gallon with a gentle heat.

Spiritus rorismarini officinalis. Edinburgh.—Spirit of rosemary.

Take of fresh rosemary tops two pounds, alcohol eight pounds. Draw off by distillation in a water-bath seven pounds.

TINCTURÆ.—Tinctures.

Tinctura aloes. London.—Tincture of aloes.

Take of extract of spiked aloes powdered half an ounce, extract of liquorice an ounce and

a half, water a pint, rectified spirit four fluid ounces. Macerate in a sand-bath until the extracts be dissolved; then strain.

Tinctura aloes socotorinæ. Edinburgh.—Tincture of socotorine aloes.

Take of socotorine aloes in powder half an ounce, extract of liquorice one ounce and a half, alcohol four ounces, water a pound. Digest during seven days with a gentle heat in a close vessel, which is to be shaken frequently (a circumstance to be attended to in the preparation of tinctures generally); then pour off the clear tincture. Dose from f. ℥ß. to f. ℥iß.

Tinctura aloes ætherea. Edinburgh.—Etherial tincture of aloes.

Take of socotorine aloes, myrrh, of each powdered an ounce and a half, English saffron cut one ounce, sulphuric ether with alcohol one pound. Digest the myrrh for four days with the ether in a closed bottle; then add the saffron, and the aloes. Again digest for four days; and, when the dregs have subsided, let the tincture be poured off.

Medical properties.—Stimulant and stomachic. Dose f. ʒij. to f. ʒiij.

Tinctura aloes composita. London.—Compound tincture of aloes.

Take of extract of spiked aloes, powdered saffron, of each three ounces, tincture of myrrh two pints. Macerate during fourteen days, and strain.

Tinctura aloes et myrrhæ. Edinburgh.—Tincture of aloes and myrrh.

Take of myrrh in powder two ounces, alcohol a pound and a half, water half a pound. Mix the alcohol with the water; then add the myrrh. Digest during four days; and lastly add of socotorine aloes in powder one ounce and a half, English saffron cut in pieces one ounce. Digest again during three days, and pour off the clear tincture. Dose from f. ʒj. to f. ʒiij.

Tinctura assafœtidæ. London.—Tincture of assafœtida.

Take of assafœtida four ounces, rectified spirit of wine two pints, water eight fluid ounces. Add the spirit to the assafœtida previously triturated with water; then digest during seven days, and strain.

Tinctura assafœtidæ. Edinburgh.—Tincture of assafœtida.

Take of assafœtida four ounces, alcohol two pounds and a half. Digest during seven days, and filter through paper. Dose from f. ʒj. to f. ʒiij.

Tinctura aurantii. London.—Tincture of orange peel.

Take of fresh orange peel three ounces, proof spirit two pints. Macerate during fourteen days, and filter. Dose from f. ʒj. to f. ʒij.

Tinctura benzoini composita. London.—Compound tincture of benzoin.

Take of benzoin three ounces, storax balsam strained two ounces, tolu balsam one ounce, extract of spiked aloes half an ounce, rectified spirit two pints. Macerate during fourteen days, and filter.

Tinctura benzoini composita. Edinburgh.—Compound tincture of benzoin.

Take of benzoin in powder three ounces, balsam of Peru two ounces, hepatic aloes powdered half an ounce, alcohol two pounds. Digest during seven days, and filter through paper.

Medical properties.—Expectorant. Dose from f. ʒj. to f. ʒij.

Tinctura bonplandiæ trifoliata. Edinburgh.—Tincture of bonplandia, or augustina.

Take of the bark of trifoliate bonplandia bruised two ounces, proof spirit two pounds and a half. Digest during seven days, and filter through paper. Dose f. ʒj. to f. ʒij.

Tinctura calumbæ. London.—Tincture of calumba.

Take of sliced calumba root two ounces and a half, proof spirit two pints. Macerate during fourteen days, and filter.

Tinctura colombæ. Edinburgh.—Tincture of calumba.

Take of columba root in powder two ounces, proof spirit two pounds. Digest during seven days, and filter through paper. Dose f. ʒj. to f. ℥ß.

Tinctura camphoræ composita. London.—Compound tincture of camphor.

Take of camphor two scruples; hard opium powdered, acid of benzoin, of each one drachm; proof spirit two pints. Macerate during fourteen days, and filter.

Tinctura opii camphorata sive elixir paregoricum Anglorum. Edinburgh.—Camphorated tincture of opium or paregoric elixir.

Take of camphor two scruples; hard purified opium powdered, benzoic acid, of each a drachm; proof spirit two pints. Digest during seven days, and filter.

Medical properties.—Anodyne and expectorant, after inflammatory symptoms have somewhat subsided. Dose from f. ʒß. to f. ʒij.

Tinctura cantharidis. London.—Tincture of blistering fly.

Take of blistering flies bruised three drachms, proof spirit two pints. Macerate during fourteen days, and filter.

Tinctura cantharidis vesicatoriæ. Edinburgh.—Tincture of blistering-fly

Take of blistering-flies bruised a drachm, proof spirit a pound. Digest for seven days, and filter through paper.

Medical properties.—Stimulant: useful in gleets and leucorrhœa. Dose from ♏x. to f. ʒj.

Tinctura capsici. London.—Tincture of capsicum.

Take of capsicum berries one ounce, proof spirit two pints. Macerate during fourteen days, and filter.

Medical properties.—Stimulant. Dose from ♏xij. to f. ʒß: f. ʒij. to a pint of water for a gargle.

Tinctura cardamomi. London.—Tincture of cardamoms.

Take of cardamom seeds husked and bruised three ounces, proof spirit two pints. Macerate during fourteen days, and filter.

Tinctura amomi repentis. Edinburgh.—Tincture of cardamoms.

Take of lesser cardamom seeds bruised four ounces, proof spirit two pounds and a half. Digest during seven days, and filter through paper.

Tinctura cardamomi composita. London.—Compound tincture of cardamoms.

Take of cardamom seeds, carraway seeds, cochineal, of each powdered two drachms, cinnamon bark bruised half an ounce, raisins stoned four ounces, proof spirit two pints. Macerate during fourteen days, and filter.

Medical properties.—Cordial. Dose f. ʒij.

Tinctura cascarillæ. London.—Tincture of cascarilla.

Take of cascarilla bark powdered four ounces, proof spirit two pints. Macerate during fourteen days, and filter.

Tinctura crotonis eleutheriæ. Edinburgh.—Tincture of croton eleutheria or cascarilla.

Take of croton eleutheria bruised four ounces, proof spirit two pounds and a half. Digest during seven days, and filter through paper. Scarcely at all used.

Tinctura castorei. London.—Tincture of castor.

Take of castor powdered two ounces, rectified spirit two pints. Macerate during seven days, and filter.

Edinburgh.—Take of castor powdered an ounce and a half, alcohol a pound. Macerate during seven days, and filter through paper.

Tinctura castorei composita. Edinburgh.—Compound tincture of castor.

Take of Russian castor in powder one ounce, assafœtida half an ounce, ammoniated alcohol one pound. Digest during seven days, and filter through paper.

Medical properties.—These tinctures are given in drachm and two drachm doses, in hysteria and spasmodic flatulencies.

Tinctura catechu. London.—Tincture of catechu.

Take of extract of catechu three ounces, cinnamon bark bruised two ounces, proof spirit two pints. Macerate during fourteen days, and filter.

Tinctura catechu acaciæ. Edinburgh.—Tincture of catechu.

Take of extract of catechu powdered three ounces, cinnamon bark bruised two ounces, proof spirit two pounds and a half. Digest during seven days, and filter through paper. Dose f. ʒj. to f. ʒiij.

Tinctura cinchonæ. London.—Tincture of cinchona.

Take of lance-leaved cinchona bark powdered seven ounces, proof spirit two pints. Macerate for fourteen days, and filter.

Tinctura cinchonæ. Edinburgh.—Tincture of cinchona.

Take of cinchona bark powdered four ounces, proof spirit two pounds and a half. Digest during seven days, and filter through paper. Dose from f. ʒij. to f. ℥ß.

Tinctura cinchonæ ammoniata. London.—Ammoniated tincture of cinchona.

Take of lance-leaved cinchona bark in powder four ounces, aromatic spirit of ammonia two pints. Macerate during two days, and filter. Dose f. ʒij. to f. ʒiij.

Tinctura cinchonæ composita. London.—Compound tincture of cinchona.

Take of lance-leaved cinchona bark in powder two ounces, dried orange peel one ounce and a half, virginian snake root bruised three drachms, saffron a drachm, cochineal powdered two scruples, proof spirit twenty fluid ounces. Macerate during fourteen days, and filter.

Huxham's tincture. Dose from f. ʒj. to f. ʒiij.

Tinctura cinnamomi. London.—*Tinctura lauri cinnamonii.* Edinburgh.—Tincture of cinnamon.

Take of cinnamon bark bruised three ounces, proof spirit two pints. Macerate during fourteen days, and filter. Dose from f. ʒj. to f. ʒiij.

Tinctura cinnamomi composita. London.—Compound tincture of cinnamon.

Take of cinnamon bark bruised six drachms, cardamom seeds bruised three drachms, long pepper powdered, ginger root sliced, of each two drachms, proof spirit two pints. Macerate during fourteen days, and filter.

Tinctura cinnamomi composita. Edinburgh.—Compound tincture of cinnamon.

Take of cinnamon bark bruised, lesser cardamom seeds bruised, of each one ounce; long pepper in powder two drachms; proof spirit two pounds and a half. Digest during seven days, and filter through paper. Dose f. ʒj. to f. ʒiij.

Tinctura conii maculati. Edinburgh.—Tincture of hemlock.

Take of dried leaves of hemlock two ounces, cardamom seeds bruised half an ounce, proof spirit sixteen ounces. Digest during seven days, and filter through paper. Dose f. ʒß.

Tinctura croci sativi. Edinburgh.—Tincture of saffron.

Take of English saffron cut in shreds one ounce, proof spirit fifteen ounces. Digest for seven days, and filter through paper. Nearly inert. Used for its color.

Tinctura digitalis. London.—Tincture of foxglove.

Take of foxglove leaves dried four ounces, proof spirit two pints. Macerate during fourteen days, and filter.

Tinctura digitalis purpureæ. Edinburgh.—Tincture of foxglove.

Take of foxglove leaves dried one ounce, proof spirit eight ounces. Digest during seven days, and filter through paper. Dose ♏x., gradually, but carefully, increased to a f. ʒj.

Tinctura gallarum. Edinburgh.—Tincture of galls.

Take of galls powdered two ounces, proof spirit sixteen ounces. Macerate during seven days, then filter through paper. Dose f. ʒj. to f. ʒiij.

Tinctura gentianæ composita. London.—Compound tincture of gentian.

Take of gentian root cut two ounces, orange peel dried one ounce, cardamom seeds bruised half an ounce, proof spirit two pints. Macerate during fourteen days, and filter.

Tinctura gentianæ composita. Edinburgh.—Compound tincture of gentian.

Take of yellow gentian root sliced and bruised two ounces, orange peel dried and bruised one ounce, canella alba bruised half an ounce, cochineal in powder half a drachm, proof spirit two pints and a half. Digest during seven days, and filter through paper. Dose f. ʒij. to ℥ß.

Tinctura guaiaci. London.—Tincture of guaiacum.

Take of guaiacum powdered half a pound,

proof spirit two pints. Macerate during fourteen days and filter.

Tinctura guaiaci officinalis. Edinburgh.—Tincture of guaiacum.

Take of guaiacum in powder six ounces, alcohol two pounds and a half. Digest during seven days, and filter through paper. Dose f. ʒj. to ʒij.

Tinctura guaiaci ammoniata. London. Edinburgh.—Ammoniated tincture of guaiacum.

Take of guaiacum in powder four ounces, aromatic spirit of ammonia one pint and a half. Macerate during fourteen (seven days Edinburgh), and filter. A good preparation. Dose f. ʒj. to f. ʒij.

Tinctura hellebori nigri. London.—Tincture of black hellebore.

Take of the root of black hellebore sliced four ounces, proof spirit two pints. Macerate during fourteen days, and filter.

Edinburgh.—Take of black hellebore root bruised two ounces, cochineal in powder fifteen grains, proof spirit fifteen ounces. Digest during seven days; then filter through paper.

Medical properties.—Emmenagogue. Dose from f. ʒß. to ʒj.

Tinctura humuli. London. Edinburgh.—Tincture of hops.

Take of hops five ounces, proof spirit two pints. Macerate during fourteen days, and strain seven days. Let the tincture be expressed, and filtered through paper.

Medical properties.—Efficacy doubtful. Dose f. ʒj. to ʒij.

Tinctura hyoscyami. London.—Tincture of henbane.

Take of the dried leaves of henbane four ounces, proof spirit two pints. Macerate during fourteen days, and filter.

Tinctura hyoscyami nigri. Edinburgh.—Tincture of black henbane.

Take of the dried leaves of black henbane an ounce, proof spirit eight ounces. Digest during seven days, and filter through paper. Substitute for opium. Dose ♏xv. to f. ʒj.

Tinctura jalapæ. London.—Tincture of jalap.

Take of jalap root powdered eight ounces, proof spirit two pints. Digest during fourteen days, and filter.

Tinctura convolvuli jalapæ. Edinburgh.—Tincture of jalap.

Take of jalap root in powder three ounces, proof spirit fifteen ounces. Digest during seven days, and filter through paper. Dose f. ʒj. to f. ʒiij.

Tinctura kino. London.—Tincture of kino.

Take of kino in powder three ounces, proof spirit two pints. Macerate during fourteen days and strain. Dose from f. ʒj. to f. ʒij.

Tinctura myrrhæ. London.—Tincture of myrrh.

Take of myrrh bruised four ounces, rectified spirit three pints. Macerate during fourteen days, and filter.

Edinburgh.—Take of myrrh in powder three ounces, alcohol twenty ounces, water ten ounces. Digest during seven days, and filter through paper. Principally employed as a wash to the mouth in cases of spongy gums.

Tinctura opii. London.—Tincture of opium.

Take of hard opium powdered two ounces and a half, proof spirit two pints. Macerate during fourteen days, and strain.

Tinctura opii. Edinburgh.—Tincture of opium, commonly called liquid laudanum.

Take of opium two ounces, proof spirit two pounds. Macerate during twelve days, and filter through paper. Dose from ♏vj. to f. ʒj. or more.

Tinctura opii ammoniata. Edinburgh.—Olim Elixir paregoricum. Ammoniated tincture of opium.

Take of opium two drachms, Benzoic acid, saffron cut in shreds, of each three drachms; volatile oil of aniseed half a drachm; ammoniated alcohol sixteen ounces. Digest during seven days, and filter through paper. Dose from f. ʒß. to ʒj.

Tinctura quassiæ excelsæ. Edinburgh.—Tincture of quassia.

Take of quassia wood rasped one ounce, proof spirit two pounds and a half. Digest during seven days, and filter through paper. Dose f. ʒij.

Tinctura rhæi. London.—Tincture of rhubarb.

Take of rhubarb root sliced two ounces, cardamom seeds bruised one ounce and a half, saffron two drachms, proof spirit two pints. Macerate during fourteen days in a gentle heat, and filter.

Tinctura rhæi. Edinburgh.—Tincture of rhubarb.

Take of rhubarb sliced three ounces, lesser cardamom seeds bruised half an ounce, proof spirit two pounds and a half. Digest during seven days, and filter through paper.

Tinctura rhæi composita. London.—Compound tincture of rhubarb.

Take of rhubarb root sliced two ounces, liquorice root bruised half an ounce, ginger root sliced, saffron, of each two drachms, proof spirit a pint, water twelve fluid ounces. Macerate with a gentle heat during fourteen days, and filter.

Tinctura rhæi et aloes. Edinburgh.—Tincture of rhubarb and aloes. Formerly sacred elixir.

Take of rhubarb root sliced ten drachms, socotorine aloes powdered six drachms, lesser cardamom seeds bruised half an ounce, proof spirit two pounds and a half. Digest during seven days, and filter through paper.

Tinctura rhæi et gentianæ. Edinburgh.—Tincture of rhubarb and gentian.

Take of rhubarb root sliced two ounces, gentian root sliced half an ounce, proof spirit two pounds and a half. Digest during seven days, and filter through paper. Dose of the above tinctures, as a purgative, from f. ℥ß. to ℥j.; for a stomachic, f. ʒj. to f. ʒiij.

Tinctura scillæ. London. Edinburgh.—Tincture of squills.

Take of recent squill root four ounces (two ounces Edinburgh), proof spirit two pints (sixteen ounces Edinburgh). Macerate during fourteen days, and filter. Dose from ♏xv. to f. ʒß.

Tinctura sennæ. London.—Tincture of senna.

Take of senna leaves three ounces, carraway seeds bruised three drachms, cardamom seeds bruised a drachm, stoned raisins four ounces, proof spirit two pints. Macerate with a gentle heat during fourteen days, and filter.

Tinctura sennæ composita. Edinburgh.—Compound tincture of senna.

Take of the leaves of senna two ounces, jalap bruised one ounce, coriander seeds bruised half an ounce, proof spirit three pounds and a half. Digest during seven days, and add four ounces of refined sugar to the tincture when filtered. Dose from f. ʒij. to f. ʒvj.

Tinctura serpentariæ. London.—Tincture of snake root.

Take of snake root three ounces, proof spirit two pints. Macerate during fourteen days, and filter.

Tinctura aristolochiæ serpentariæ. Edinburgh. Tincture of snake root.

Take of snake root bruised two ounces, cochineal in powder a drachm, proof spirit two pounds and a half. Digest during seven days, and filter through paper. Dose from f. ʒß. to f. ʒij.

Tinctura toluiferæ balsami. Edinburgh.—Tincture of tolu.

Take of balsam of tolu one ounce and a half, alcohol a pound. Digest until the balsam be dissolved, and filter through paper. Very little used.

Tinctura valerianæ. London.—Tincture of valerian.

Take of valerian root in powder four ounces, proof spirit two pints. Macerate during fourteen days, and filter. Dose f. ʒj. to f. ʒij.

Tinctura valerianæ ammoniata. London.—Ammoniated tincture of valerian.

Take of valerian root four ounces, aromatic spirit of ammonia two pints. Macerate during fourteen days, and filter. Dose f. ʒj.

Tinctura veratri albi. Edinburgh.—Tincture of white hellebore.

Take of white hellebore root bruised eight ounces, proof spirit one pound and a half. Digest during seven days, and filter through paper. But little used. Dose ♏v to ♏x.

Tinctura zingiberis. London. *Tinctura amomi zingiberis.* Edinburgh.—Tincture of ginger.

Take of ginger root sliced two ounces, rectified spirit two pints. Macerate during fourteen days (seven days, Edinburgh), and filter. Dose f. ʒj. to ʒij.

Ætherea.—Preparations of ether.

Æther sulphuricus.—Sulphuric ether.

For the modes of preparing sulphuric ether, and the theory of its composition, see Chemistry.

Spiritus ætheris aromaticus. London.—Aromatic spirit of ether

Take of cinnamon bark bruised three drachms, cardamom seeds powdered a drachm and a half, long pepper powdered, ginger root sliced, of each a drachm, spirit of sulphuric ether a pint. Macerate during fourteen days in a stopped glass bottle, and strain.

Æther sulphuricus cum alcoholi aromaticus. Edinburgh.—Aromatic sulphuric ether with alcohol.

Take of cinnamon bark bruised, card seeds bruised, each an ounce; long pepper bru two drachms; sulphuric ether with alcohol two pounds and a half. Digest during seven days, and filter through paper.

Spiritus ætheris nitrici. London.—Spirit of nitric ether.

Take of rectified spirit two pints, nitric acid (by weight) three ounces. Add the acid gradually to the spirit, and mix them, taking care that the temperature during the mixture does not exceed 120°; then distil over by a gentle heat twenty-four fluid ounces.

Spiritus ætheris nitrosi. Edinburgh.—Spirit of nitrous ether.

Take of alcohol three pounds, nitrous acid one pound. Pour the alcohol into a large phial placed in a vessel filled with cold water, and gradually add the acid with frequent agitation. Let the phial be slightly corked, and placed in a cool place during seven days; then distil the liquor by the heat of boiling water, into a receiver kept cool with snow or water, so long as any spirit comes over.

Medical properties.—Refrigerant, diuretic, and antispasmodic. Dose from f. ʒß. to f. ʒj.

Spiritus ætheris sulphurici. London.—Spirit of sulphuric ether.

Take of sulphuric ether half a pint, rectified spirit a pint. Mix them.

Æther sulphuricus cum alcohole. Edinburgh.—Sulphuric ether with alcohol.

Take of sulphuric ether one part, alcohol two parts. Mix them.

Medical properties.—Stimulant, antispasmodic, and narcotic. Dose of the ether itself from f. ʒß. to f. ʒij., of the spirit from f. ʒj. to f. ʒiij.

Spiritus ætheris sulphurici compositus. London.—Compound spirit of ether.

Take of spirit of sulphuric ether a pint, ethereal oil two fluid drachms. Mix. A substitute for Hoffman's anodyne. Dose from f. ʒß. to f. ʒij.

Vina.—Wines.

Vinum aloes. London.—Wine of aloes.

Take of extract of spiked aloes eight ounces, canella bark two ounces, proof spirit, distilled water, of each four pints. Rub the extract to powder with white sand previously freed from impurities; rub also the canella bark into powder, and on these mixed together let the water and spirits be poured; then digest with frequent agitation, during fourteen days, and strain.

Vinum aloes socotorinæ. Edinburgh.—Wine of socotorine aloes.

Take of socotorine aloes in powder one ounce, lesser cardamom seeds bruised, ginger root bruised, of each a drachm, Spanish white wine two pounds. Digest for seven days, agitating the mixture frequently and strain. The formula of the London college is absurdly termed a wine.

Medical properties.—Stomachic and purgative. Dose from f. ʒj. to f. ʒiij. for the first intention, from f. ℥ß. to f. ℥iß. for the second.

Vinum colchici. London.—Wine of colchicum.

Take of the fresh root of colchicum bruised

two ounces, proof spirit twelve fluid ounces, distilled water twenty fluid ounces. Macerate during fourteen days, and filter. Sherry wine is a better solvent for the colchicum than spirit. (Thomson).

Medical properties.—Sedative, purgative, and antiarthritic. Dose from ♏xv. to f. ʒj.: in increasing its dose its effects should be carefully watched.

Vinum gentianæ compositum. Edinburgh.—Compound wine of gentian.

Take of gentian root half an ounce, cinchona bark one ounce, orange peel dried two drachms, canella one drachm, proof spirit four ounces, Spanish white wine two pounds and a half. Pour first the proof spirit on the root and the bark sliced and bruised, and at the end of twenty-four hours add the wine; then macerate during seven days, and strain. Dose f. ʒß.

Vinum ipecacuanhæ. London.—Wine of ipecacuanha.

Take of ipecacuanha root bruised two ounces, proof spirit twelve fluid ounces, distilled water twenty fluid ounces. Macerate during fourteen days, and filter.

Edinburgh.—Take of the root of ipecacuanha bruised two ounces, Spanish white wine two pints. Digest during seven days, then filter. Dose as an emetic from f. ʒij. to f. ℥j. for an adult. As an expectorant, &c., ♏xij. to f. ʒß.

Vinum nicotianæ tabaci. Edinburgh.—Wine of tobacco.

Take of tobacco leaves one part, Spanish white wine twelve parts. Macerate during seven days, and filter through paper.

Medical properties.—Diuretic and antispasmodic. Dose from ♏x. to f. ʒß.

Vinum opii. London. Edinburgh.—Wine of opium.

Take of extract of opium an ounce, cinnamon bark bruised, clove bruised, of each a drachm, proof spirit six fluid ounces, distilled water ten fluid ounces. Macerate during eight days (seven Edinburgh), and filter.

Medical properties.—Useful where opium in substance or mere tincture is objectionable. Dose ♏xij. to f. ʒß. or ʒj.

Vinum rhæi. Edinburgh.—Wine of rhubarb.

Take of sliced rhubarb root two ounces, canella bark bruised a drachm, proof spirit two ounces, Spanish white wine fifteen ounces. Macerate during seven days, and filter through paper. Dose from f. ℥ß. to f. ℥iß.

Vinum veratri. London.—Wine of white hellebore.

Take of white hellebore root bruised eight ounces, proof spirit a pint, distilled water a pint and a half. Macerate during fourteen days, and filter. Seldom employed. Dose ♏x. to f. ʒß.

Acetica.—Preparations with vinegar.

Acidum aceticum aromaticum. Edinburgh.—Aromatic vinegar.

Take of rosemary tops dried, sage leaves dried, of each one ounce; lavender flowers dried half an ounce; cloves bruised half a drachm; distilled vinegar two pounds. Macerate during seven days, and filter the expressed liquor through paper.

Medical properties.—Chiefly employed to correct the odor of sick rooms. Dose internally as a stimulant from f. ʒß. to f. ʒj.

Acidum aceticum camphoratum. Edinburgh.—Camphorated acetic acid.

Take of acetic acid six ounces, camphor half an ounce. Rub the camphor to powder by the assistance of a small quantity of alcohol; then dissolve it in the acid.

Medical properties.—Snuffed up the nostrils in faintings and languors.

Acetum colchici. London.—Vinegar of meadow saffron (colchicum).

Take of fresh meadow saffron root sliced an ounce, distilled vinegar a pint, proof spirit a fluid ounce. Macerate the meadow saffron root with the vinegar in a covered glass vessel during twenty-four hours; then express, and set the liquor aside for the subsidence of the fæculencies. Lastly, add the spirit to the clear liquor.

Medical properties.—Diuretic, sedative, and antiarthritic. Dose from f. ʒß. to f. ʒj.

Acetum scillæ. London.—Vinegar of squill.

Take of fresh squill root dried a pound, distilled vinegar six pints, proof spirit half a pint. Macerate the squill root in the vinegar with a gentle heat and in a covered vessel during twenty-four hours; then express the liquor, and set it aside for the subsidence of the fæculencies. Lastly add the spirit to the clear liquor.

Acidum aceticum scilliticum. Edinburgh.—Vinegar of squill.

Take of squill root dried one ounce, distilled vinegar fifteen ounces, alcohol one ounce and a half. Macerate the squill with the acid during seven days; then express the liquor, and add the alcohol to it. When the fæculenoies have subsided pour off the clear liquor. Dose from f. ʒß. to f. ʒij.

Mellita.—Preparations with honey.

Mel dispumatum. London.—Clarified honey.

Melt the honey in a water-bath; then separate the scum.

Mel boracis. London.—Honey of borax.

Take of subborate of soda powdered a drachm, clarified honey one ounce. Mix them.

Medical properties.—Useful in apthous affections of the fauces as a local detergent.

Mel rosæ. London.—Rose honey.

Take of the petals of the red rose dried four ounces, boiling water three pints, clarified honey five pounds. Macerate the petals in the water during six hours, and boil it down by means of a water-bath to a proper consistence. This is chiefly employed as an adjunct to gargles.

Oxymel simplex. London.—Simple oxymel.

Take of clarified honey two pounds, distilled vinegar one pound. Boil them in a glass vessel by a gentle heat to due consistence. A cooling beverage in fevers. Dose f. ʒj. or f. ʒij. dissolved in water or barley water.

Oxymel scillæ. London.—Oxymel of squill.

Take of clarified honey three pounds, vinegar of squill two pints. Boil in a glass vessel over a gentle fire to a due consistence.

Medical properties.—Expectorant. Dose f. ʒß to f. ʒij.

SYRUPI.—Syrups.

These with a very few exceptions might be banished from the pharmacopœias and disused in extemporaneous prescription.

Syrupus simplex. London.—Syrup.

Take of refined sugar two pounds and a half, water a pint. Dissolve the sugar in the water by means of a water-bath; then set it aside for twenty-four hours; separate the scum, and if there be any fæces, pour off the clear part from them.

Syrupus simplex. Edinburgh.—Simple syrup.

Take of purified sugar fifteen parts, water eight parts. Dissolve the sugar in the water by a gentle heat, and boil it a little so as to form syrup.

Syrupus aceti. Edinburgh.—Syrup of vinegar.

Take of vinegar five parts, refined sugar seven parts. Boil so as to form syrup. Useful in mixing with barley water in febrile and inflammatory disorders.

Syrupus althææ. London.—Syrup of marsh mallows.

Take of fresh marsh mallow root bruised half a pound, refined sugar two pounds, water four pints. Boil the water with the root down to one half, and express the liquor when it is cold; set it aside for twenty-four hours for the subsidence of the fæces, then decant off the clear liquor, and, having added the sugar to it, boil down to a due consistence.

Syrupus althææ officinalis. Edinburgh.—Syrup of marsh mallows.

Take of fresh root of marsh mallows sliced one part, water ten parts, refined sugar four parts. Boil the water with the root down to one half, and strain by strong expression. Put aside the strained liquor, and when the fæces have subsided add the sugar to it; then boil so as to form a syrup. A useless preparation, only slightly demulcent.

Syrupus aurantiorum. London.—Syrup of oranges.

Take of fresh orange peel two ounces, boiling water a pint, refined sugar three pounds. Macerate the peel in the water during twelve hours in a covered vessel; then pour the liquor off, and add the sugar to it.

Syrupus citri aurantii. Edinburgh.—Syrup of orange.

Take of the fresh peel of Seville oranges three ounces, boiling water one pound and a half, refined sugar three pounds. Macerate the peel with the water in a covered vessel during twelve hours; then add the sugar to the strained liquor, and subject it to a gentle heat so as to form a syrup.

Syrupus colchici autumnalis. Edinburgh.—Syrup of meadow saffron.

Take of fresh meadow saffron root cut into thin slices one ounce, distilled vinegar sixteen ounces, refined sugar twenty-six ounces. Macerate the root in the acid during two days, occasionally shaking the vessel; then expressing gently, strain the liquor, and add the sugar to it. Lastly, boil a little so as to form syrup. Dose f. ʒß. to f. ʒvj. gradually increased.

Syrupus croci. London.—Syrup of saffron.

Take of saffron one ounce, boiling water one pint, refined sugar two pounds and a half. Macerate the saffron in the water during twelve hours in a slightly covered vessel; then filter the liquor, and add to it the sugar.

Syrupus dianthi caryophylli. Edinburgh.—Syrup of the clove July flower.

Take of recent petals of the clove July flower freed from their claws one part, boiling water four parts, refined sugar seven parts. Macerate the petals in the water during twelve hours; then, to the liquor being strained add the sugar, and dissolve it with a gentle heat.

Syrupus lemonum. London.—Syrup of lemon.

Take of strained lemon juice a pint, refined sugar two pounds. Dissolve the sugar in the juice in the manner ordered for syrup.

Syrupus citri medicæ. Edinburgh.—Syrup of lemons.

Take of lemon juice strained, after the fæces have subsided, three parts; refined sugar five parts. Dissolve the sugar. An agreeable syrup for acidulating drinks.

Syrupus mori. London.—Syrup of mulberry.

Take of strained mulberry juice a pint, refined sugar two pounds. Let the sugar be dissolved in the juice in the manner directed for syrup.

Syrupus papaveris. London.—Syrup of poppy.

Take of the dried capsules of the poppy bruised and freed from seeds fourteen ounces, prepared sugar two pounds, boiling water two gallons and a half. Macerate the capsules in the water during twelve hours; then boil the whole in a water-bath down to one gallon, and strongly express. Boil the liquor again down to two pounds, and strain it while it is hot. Set it aside twelve hours for the subsidence of the fæces; then boil the clear liquor down to one pint, and add the sugar in the manner directed for making syrup.

Syrupus papaveris somniferi. Edinburgh.—Syrup of white poppy.

Take of the capsules of the white poppy dried and freed from the seeds one part, boiling water fifteen parts, refined sugar two parts. Macerate the sliced capsules in the water during twelve hours; then boil until a third part only of the liquor remains, and strain the decoction by strong expression. Boil the strained liquor down to one-half, and strain it again. Lastly, having added the sugar boil for a short time so as to form syrup. A useful anodyne. Dose from f. ʒj. to f. ℥j.

Syrupus rhœados. London.—Syrup of the red poppy.

Take of the recent petals of the red poppy a pound, boiling water a pint and two fluid ounces, refined sugar a pound and a half. To the water heated in a water-bath gradually add the petals of the red poppy, stirring them occasionally; then, having removed the vessel, macerate during twelve hours, press out the liquor, and set it aside for the subsidence of the impurities. Lastly, add the sugar in the manner ordered for making syrup. A mere coloring syrup.

Syrupus rhamni. London.—Syrup of buckthorn.

Take of the fresh juice of buckthorn berries four pints, ginger root sliced, pimento berries bruised, of each an ounce, refined sugar three pounds and a half. Set apart the juice three days for the subsidence of the fæces; then strain.

To a pint of the cleared juice add the ginger root and pimento berries; then macerate with a gentle heat during four hours, and strain. Boil the remainder of the juice down to a pint and a half; mix the liquors, and add the sugar in the manner ordered for making syrup.

Syrupus rhamni cathartici. Edinburgh.—Syrup of buckthorn.

Take of the clarified juice of ripe buckthorn berries two parts, refined sugar one part. Boil so as to form syrup. The London formula the best. A brisk cathartic. Dose from f. ʒij. to f. ℥j.: not much used excepting in veterinary practice.

Syrupus rosæ. London.—Syrup of the rose.

Take of the petals of the hundred-leaved rose dried seven ounces, refined sugar six pounds, boiling water four pints. Macerate the rose petals in the water for twelve hours, and strain. Evaporate the strained liquor in a water-bath down to two pints and a half; then add the sugar so as to form syrup.

Syrupus rosæ centifoliæ. Edinburgh.—Syrup of damask roses.

Take of the fresh petals of the damask rose one part, boiling water four parts, refined sugar three parts. Macerate the petals in the water during twelve hours; then add the sugar to the strained liquor, and boil so as to form syrup. A gentle laxative. Dose from f. ʒij. to f. ℥iß.

Syrupus rosæ gallicæ. Edinburgh. Syrup of red roses.

Take of the petals of the red rose dried one part, boiling water nine parts, refined sugar ten parts. Macerate the petals in the water during twelve hours; then boil a little and strain. Add the sugar to the strained liquor, and again boil a little so as to form a syrup. A weak astringent.

Syrupus sarsaparillæ. London. Syrup of sarsaparilla.

Take of sarsaparilla root one pound, boiling water one gallon, refined sugar one pound. Macerate the root in the water during twenty-four hours, then boil down to four pints, and strain the liquor while hot; lastly, add the sugar and evaporate to a due consistence. A useless preparation.

Syrupus scillæ maritimæ. Edinburgh. Syrup of squill.

Take of vinegar of squill four parts, refined sugar in powder seven parts. Dissolve the sugar by a gentle heat so as to form syrup. Dose from f. ʒj. to f. ʒij.

Syrupus sennæ. London.—Syrup of senna.

Take of senna leaves two ounces, fennel seeds bruised one ounce, manna three ounces, refined sugar a pound, boiling water a pint. Macerate the senna leaves and the fennel seeds in the water in a gentle heat during twelve hours; strain the liquor; mix with it the manna and sugar, and boil down to a due consistence.

Syrupus cassiæ sennæ. Edinburgh.—Syrup of senna.

Take of senna leaves two ounces, boiling water a pound and a half, burnt syrup eight ounces. Macerate the leaves in the water in a covered vessel during four hours and strain; then add the syrup, and boil with a gentle heat until the whole acquire the consistence of the burnt syrup. Chiefly employed for children. Dose from ʒij. to f. ℥j

Syrupus tolutanus. London.—Syrup of tolu.

Take of balsam of tolu an ounce, boiling water a pint, refined sugar two pounds. Boil the balsam in the water during half an hour in a close vessel, frequently stirring it, and strain the liquor when cold; then add the sugar so as to form syrup.

Syrupus toluiferæ balsami. Edinburgh.—Syrup of tolu.

Take of simple syrup two pounds, tincture of balsam of tolu one ounce. To the syrup, immediately upon its being made and before it is quite cold, add gradually the tincture, frequently stirring.

Syrupus violæ odoratæ. Edinburgh.—Syrup of violet.

Take of the flowers of the odorous violet two parts, boiling water eight parts, refined sugar fifteen parts. Macerate the flowers in the water during twenty-four hours in a covered glass or glazed earthen ware vessel: then strain without expression, and add a sufficient quantity of sugar to make syrup. This syrup is principally employed as a test of acids and alkalies; but it is an agreeable laxative for young children.

Syrupus zingiberis. London.—Syrup of ginger.

Take of ginger roots sliced two ounces, boiling water a pint, refined sugar two pounds. Macerate the ginger root in the water during four hours and strain; then add the sugar so as to form syrup.

Syrupus amomi zingiberis. Edinburgh.—Syrup of ginger.

Take of ginger root powdered six drachms, boiling water one pound, refined sugar twenty-two ounces. Macerate the root in the water, the vessel being covered, for twenty-four hours; then add the sugar to the strained infusion and dissolve by a gentle heat. Carminative. Dose f. ʒij.

Confectiones.—Confections.

Conserves and electuaries are included under this head in the last edition of the London Pharmacopœia.

Confectio amygdalarum. London. — Confection of almonds.

Take of sweet almonds an ounce, acacia gum in powder a drachm, refined sugar half an ounce. Macerate the almonds in water to separate the cuticle; then beat all the ingredients together, until they be completely incorporated. Used for forming the almond mixture.

Confectio aromatica. London.—Aromatic confection.

Take of cinnamon bark, nutmegs, of each two ounces; cloves one ounce; cardamom seeds half an ounce; saffron dried two ounces; prepared shells sixteen ounces; refined sugar in powder two pounds; water a pint. Rub the dry substances mixed together into a very fine powder; then gradually add the water, and mix until the whole be thoroughly incorporated.

Electuarium aromaticum. Edinburgh.—Aromatic electuary.

Take of the aromatic powder one part, syrup of orange two parts. Mix, and beat them well together so as to make an electuary. An excellent form of giving cordials and aromatics. Dose from ℈ß to ʒß or more.

Confectio aurantiorum. London.—Confection of oranges.

Take of the outer rind of the fresh orange separated by rasping a pound, refined sugar three pounds. Beat the rind in a stone mortar with a wooden pestle; then add the sugar and continue the beating until they be completely incorporated.

Conserva citri aurantii. Edinburgh.—Conserve of oranges.

Grate off the outer rind of Seville oranges, beat it into a pulp, and while beating it add gradually three times its weight of refined sugar. Stomachic. Dose ʒj. to ℥ß

Confectio cassiæ. London.—Confection of cassia.

Take of fresh cassia pulp half a pound, manna two ounces, tamarind pulp one ounce, syrup of roses half a pound. Bruise the manna; then dissolve it in the syrup by the heat of a water-bath, and, having mixed in the pulp, evaporate to a due consistence.

Electuarium cassiæ fistulæ. Edinburgh.—Electuary of cassia.

Take of cassia pulp four parts, tamarind pulp, manna, of each one part, syrup of damask roses our parts. Bruise the manna in a mortar, and dissolve it in the syrup by means of a gentle heat; then add the pulps, and by a continued heat reduce the mixture to a due consistence. Gently laxative. Dose ʒj. to ʒvj.

Confectio opii. London.—Confection of opium.

Take of hard opium in powder six drachms, long pepper an ounce, ginger root two ounces, carraway seeds three ounces, syrup a pint. Rub the opium with the syrup made hot; then add the remaining articles reduced to powder and mix them.

Electuarium opiatum. Edinburgh.—*Olim electuaruim thebaicum.*—Opiate electuary, formerly thebaic electuary.

Take of aromatic powder six ounces, Virginian snake root in fine powder three ounces, opium diffused in a sufficient quantity of Spanish white wine half an ounce, syrup of ginger a pound. Mix so as to form an electuary.

Medical properties.—Excellent forms of giving opium in chronic affections of the bowels, &c. Dose from gr. vj. to ℈ij.

Confectio piperis nigri. London.—Confection of black pepper.

Take of black pepper, elecampane root, of each one pound; fennel seeds three pounds; honey, refined sugar, of each three pounds. Rub the dry ingredients together into a fine powder; then add the honey and beat the whole into a mass. A substitute for Ward's paste. Dose ʒj. to ʒij.

Electuarium catechu compositum. Edinburgh. —Compound electuary of catechu.

Take of extract of catechu four ounces, kino three ounces, cinnamon bark, nutmegs, of each one ounce, opium diffused in a sufficient quantity of Spanish white wine a drachm and a half, syrup of red roses boiled to the thickness of honey, two pounds and a quarter. Reduce the solid ingredients to powder; then mix them with the opium and honey so as to make an electuary. Dose ʒß to ʒij.

Confectio rosæ caninæ. London.—Confection of the dog-rose.

Take of the pulp of the dog-rose a pound, refined sugar in powder twenty ounces. Rub them together so as completely to incorporate them.

Confectio rosæ gallicæ. London.—Confection of the red rose.

Take of the unblown petals of the red rose freed from the claws a pound, refined sugar three pounds. Beat the petals in a stone mortar; then add the sugar, and beat again until the whole be completely incorporated.

Edinburgh.—Beat the unblown petals of the red rose to a pulp, and add, during the beating, three times their weight of refined sugar.

Confectio rutæ. London.—Confection of rue.

Take of rue leaves dried, carraway seeds, laurel berries, of each an ounce and a half; sagapenum half an ounce; black pepper two drachms; clarified honey sixteen ounces. Let the dry articles be rubbed together into a very fine powder; then add the honey, and mix the whole together. Used principally rubbed down with gruel in enemeta for childrens' convulsions; one or two scruples being employed as a dose.

Confectio scammoniæ. London.—Confection of scammony.

Take of scammony in powder an ounce and a half; bruised cloves, powdered ginger root, of each six drachms; oil of carraway half a drachm; syrup of roses a sufficient quantity. Rub the dry substances into a very fine powder; then gradually add the syrup, and rub them again; lastly, after adding the oil of carraway, mix the whole.

Confectio sennæ. London.—Confection of senna.

Take of senna leaves eight ounces; figs a pound; tamarind pulp, cassia pulp, the pulp of prunes, of each half a pound; coriander seeds four ounces; liquorice root three ounces; refined sugar two pounds and a half. Powder the senna leaves with the coriander seeds, and separate ten ounces of the mixed powder by sifting. Boil the residue with the figs and liquorice root in four pints of water until it be reduced one half; then press out and strain the liquor. Evaporate the strained liquor in a water-bath until of the whole only a pint and a half remain; then the sugar being added make a syrup; finally mix the pulps gradually with the syrup, and having added the sifted powder let the whole be mixed together.

Electuarium sennæ compositum. Edinburgh.—Compound electuary of senna.

Take of senna leaves eight ounces, coriander seeds four ounces, liquorice root bruised three ounces, figs, pulp of prunes, of each a pound, pulp of tamarinds half a pound, refined sugar two pounds and a half, water four pounds. Rub the senna with the coriander, and separate ten ounces of the mixed powder by sifting. Boil the residue with the figs and liquorice root in the water down to one half; then express and strain. Evaporate the strained liquor to about a pound and a half; add the sugar, and gradually the pulps; and lastly mix in the powder.

Medical properties.—Mild and efficacious purgatives, similar to the old lenitive electuary. Dose ʒij. to ℥ß.

Pulveres.—Powders.

Pulvis aloes compositus. London.—Compound powder of aloes.

Take of extract of spiked aloes an ounce and a half, guaiacum gum resin an ounce, compound powder of cinnamon half an ounce. Let the extract of aloes and the guaiacum be powdered separately, then mix them with the compound powder of cinnamon.

Medical properties.—Warm cathartics. Dose ℈ß to ℈j.

Pulvis asari compositus. Edinburgh.—Compound powder of asarabacca.

Take of the leaves of asarabacca three parts, the leaves of majoram, and flowers of lavender, of each one part. Let them be rubbed together into a powder.

Principally used in tooth ache, snuffed up the nostrils.

Pulvis cinnamomi compositus. London.—Compound powder of cinnamon.

Take of cinnamon bark two ounces, cardamom seeds one ounce and a half, ginger root one ounce, long pepper half an ounce. Rub them together into a very fine powder.

Pulvis aromaticus. Edinburgh.—Aromatic powder.

Take of cinnamon bark, cardamom seeds, ginger root, of each equal parts. Rub them to a very fine powder, which must be preserved in a well stopped phial.

Medical properties.—Aromatic and carminative. Dose ℈ß to ℈j.

Pulvis contrayervæ compositus. London.—Compound powder of contrayerva.

Take of contrayerva root in powder five ounces, prepared shells a pound and a half. Let them be mixed.

Medical properties.—Sudorific and stimulant, not so much used as formerly. Dose ℈ß to ʒß.

Pulvis cornu usti cum opio. London.—Powder of burnt hartshorn with opium.

Take of hard opium in powder a drachm, hartshorn burnt and prepared an ounce, cochineal powder a drachm. Let them be mixed.

Pulvis opiatus. Edinburgh.—Opiate powder.

Take of opium one part, prepared carbonate of lime nine parts. Let them be rubbed together into a fine powder. Dose of these powders gr. v. to ℈j.

Pulv cretæ compositus. London.—Compound powder of chalk.

Take of prepared chalk half a pound, cinnamon bark four ounces, tormentil root and acacia gum of each three ounces, long pepper half an ounce. Let them separately be rubbed into fine powder, and then the whole mixed.

Pulvis carbonatis calcis compositus. Edinburgh.—Compound powder of carbonate of lime.

Take of prepared carbonate of lime four ounces, cinnamon bark a drachm and a half, nutmeg half a drachm. Rub them together into a powder.

Medical properties.—Astringent and antacid; the London preparation the most efficacious. Dose gr. v. to ℈j.

Pulv. cretæ compositus cum opio. London.—Compound powder of chalk with opium.

Take of compound powder of chalk six ounces and a half; hard opium four scruples. Let them be mixed.

Medical properties.—Anodyne as well as astringent. Dose from gr. xv. to ℈ij.

Pulvis jalapæ compositus. Edinburgh.—Compound powder of jalap.

Take of powder of jalap root one part, supertartrate of potassa two parts. Let them be rubbed together into a fine powder.

Medical properties.—Deobstruent, and purgative. Dose ℈j. to ℈ij.

Pulvis ipecacuanhæ compositus. London.—Compound powder of ipecacuanha.

Take of ipecacuanha root powdered, hard opium in powder, of each a drachm; sulphate of potassa powdered one ounce. Mix them.

Pulvis ipecacuanhæ et opii. Edinburgh.—Powder of ipecacuanha and opium.

Take of ipecacuanha root powdered, opium, of each one part; sulphate of potassa eight parts. Rub them together into a fine powder

Medical properties.—Sudorific. A substitute for the old Dover's powder. Dose grs. v. to ℈j.

Pulvis kino compositus. London.—Compound powder of kino

Take of kino fifteen drachms, cinnamon bark half an ounce, hard opium a drachm. Rub them separately into a very fine powder, and mix them.

Medical properties.—Astringent. Dose ℈ß. to ℈j.

Pulvis salinus compositus. Edinburgh.—Compound saline powder.

Take of pure muriate of soda, sulphate of magnesia, of each four parts; sulphate of potassa three parts. Dry the salts with a gentle heat; then powder them separately, and afterwards rub them together. Let the powder be preserved in a well stopped vial.

Medical properties.—Purgative. Dose from ʒß. to ʒj.

Pulvis scammoniæ compositus. London.—Compound powder of scammony.

Take of scammony, hard extract of jalap, of each two ounces; ginger root half an ounce. Rub them separately into a very fine powder, and mix them.

Pulvis scammoniæ compositus. Edinburgh.—Compound powder of scammony.

Take of scammony, supertartrate of potassa, of each equal parts. Let them be rubbed together to a very fine powder.

Medical properties.—Cathartic, and vermifuge. Dose of the first from grs. x. to ℈j., of the second from ℈ß. to ʒß.

Pulvis sennæ compositus. London.—Compound powder of senna.

Take of senna leaves, supertartrate of potassa, of each two ounces; scammony half an ounce; ginger root two drachms. Reduce the scammony to a very fine powder by itself, and the other ingredients together; then mix the whole.

Pulvis aluminis compositus. Edinburgh.—Compound powder of alum.

Take of sulphate of alum four parts, kino one part. Let them be rubbed together to a fine powder.

Medical properties.—Astringent. Dose ℈ß. to be taken dry.

Pulvis tragacanthæ compositus. London.—Compound powder of tragacanth.

Take of tragacanth powder, acacia gum powdered, starch, of each one ounce and a half; refined sugar three ounces. Let the starch and the sugar be rubbed together to a powder; then add the tragacanth and the acacia gum; and mix the whole together.

Medical properties.—Demulcent. Dose ℈ij. to ʒiß.

Pilulæ.—Pills.

Pilulæ aloes compositæ. London.—Compound aloetic pills.

Take of extract of spiked aloes powdered an ounce, extract of gentian half an ounce, oil of carraway forty minims, syrup a sufficient quantity. Beat them together until they combine into a uniform mass.

Pilulæ aloeticæ. Edinburgh.—Aloetic pills.

Take of socotorine aloes in powder, soap, of each equal parts. Beat them with simple syrup so as to form a mass proper for making into pills.

Medical properties.—Purgative and stomachic. Dose ℈ß. to ℈j.

Pilulæ aloes et assafœtidæ. Edinburgh.—Pills of aloes and assafætida.

Take of socotorine aloes in powder, assafœtida soap, of each equal parts. Let them be beat into a mass with mucilage of gum arabic.

Medical properties.—Stomachic and aperient. Dose ℈ß.

Pilulæ aloes cum myrrha. London.—Pills of aloes with myrrh.

Take of extract of spiked aloes two ounces, saffron, myrrh, of each one ounce, syrup a sufficient quantity. Rub the aloes and myrrh separately to powder; and beat the whole into a mass.

Pilulæ aloes et myrrhæ. Edinburgh.—Pills of aloes and myrrh.

Take of socotorine aloes four parts, myrrh two parts, saffron one part. Beat them into a mass with simple syrup. Deobstruent, and cathartic. Dose ℈ß. to ℈j.

Pilulæ ammoniareti cupri. Edinburgh.—Pills of ammoniaret of copper.

Take of ammoniaret of copper rubbed to fine powder sixteen grains, crumb of bread four scruples, water of carbonate of ammonia a sufficient quantity. Let them be beaten into a mass and formed into thirty-two equal pills.

Medical properties.—Antiepileptic. Dose one pill twice a day, gradually increased.

Pilulæ cambogiæ compositæ. London. Edinburgh.—Compound pills of gamboge.

Take of gamboge in powder a drachm, extract of spiked aloes a drachm and a half, ginger in powder half a drachm, soap two drachms. Mix the powders together; then add the soap, and beat the whole into a mass.

Pilulæ colocynthidis compositæ. Edinburgh.—Compound colocynth pills.

Take of socotorine aloes, scammony, of each eight parts, colocynth pulp four parts, sulphate of potassa, oil of cloves, of each one part. Beat together the extract, gum resin, and sulphate, into powder, then with the colocynth pulp rubbed to fine powder. Mix them with the oil, and finally beat the whole into a mass with mucilage of gum.

Pilulæ ferri compositæ. London.—Pills of with myrrh.

Take of myrrh in powder two drachms, subcarbonate of soda, sulphate of iron, sugar, of each a drachm. Rub the myrrh with the subcarbonate of soda, then having added the sulphate of iron rub again, and lastly beat the whole into one mass.

Pilulæ galbani composita. London.—Compound pills of galbanum.

Take of galbanum an ounce, myrrh, sagapenum, of each an ounce and a half, assafœtida half an ounce, syrup a sufficient quantity. Beat them together into a mass.

Pilulæ assafœtidæ compositæ. Edinburgh.—Compound assafœtida pills.

Take of assafœtida, galbanum, myrrh, of each eight parts, purified oil of amber one part. Beat them with simple syrup into a mass.

Medical properties.—Emmenagogue, and antispasmodic. Dose ℈ß. to ℈j.

Pilulæ hydrargyri. London.

Take of purified mercury two drachms, confection of red roses three drachms, liquorice root in powder a drachm. Rub the mercury with the confection until globules no longer are seen; then add the liquorice root, and beat the whole into one mass.

Edinburgh.—Take of purified mercury, conserve of the red rose, of each one ounce, starch two ounces. Rub the mercury with the conserve in a glass mortar until the globules entirely disappear, adding if necessary a little mucilage of gum arabic; then add the starch, and beat the whole into a mass with a little water, which is to be immediately divided into 480 equally sized pills. It is undetermined whether, in these preparations, the mercury is merely divided mechanically or whether it undergoes oxidation.

Medical properties.—Alterative, antisyphilitic, and stimulant. Dose from grs. v. to ℈i. or more, accordingly as it may be desirable or not to produce the specific action of the mercury.

Pilulæ hydrargyri submuriatis compositæ. London. Edinburgh.—Pills of submuriate of mercury.

Take of submuriate of mercury, precipitated sulphuret of antimony, of each two drachms, guaiacum gum resin rubbed down, half an ounce, rectified spirit half a drachm. Rub the submuriate with the precipitated sulphuret of antimony, then with the guaiacum, and add a sufficient quantity of spirit (mucilage Edin.) to give them a proper consistence.

Medical properties.—A useful alterative and deobstruent. Dose grs. v. to ℈i. It is the Plummer's pill of the old pharmacopœias.

Pilulæ rhæi compositæ. Edinburgh.—Compound rhubarb pills.

Take of rhubarb root in powder one ounce, socotorine aloes six drachms, myrrh half an ounce, volatile oil of peppermint half a drachm. Beat them into a mass with syrup of orange-peel.

Medical properties.—Stomachic and carminative. Dose ℈ß. to ℈j.

Pilulæ saponis cum opio. London.—Pills of soap and opium.

Take of hard opium powdered half an ounce, hard soap two ounces. Beat them together till they become a mass.

Pilulæ opiatæ. Olim *pilulæ thebaicæ.* Edinburgh.—Opiate pills, formerly thebaic pills.

Take of opium one part, extract of liquorice seven parts, pimento berries two parts. Mix separately the opium and the extract, softened with diluted alcohol, and beat them into a pulp; then add the Jamaica pepper rubbed to powder, and let the whole be beaten into a mass. Dose of the London formula grs. v.; of the Edinburgh ℈ß.

Pilulæ scillæ compositæ. London.—Compound squill pills.

Take of fresh squill root dried and powdered one drachm, ginger root powdered and hard soap of each three drachms, ammoniacum powdered two drachms. Mix the powders together; then beat them with the soap, adding so much syrup as will give a proper consistence.

Pilulæ scilliticæ. Edinburgh.—Squill pills.

Take of squill root dried and rubbed to a fine powder one scruple, ammoniacum, cardamom seeds powdered, extract of liquorice, one drachm. Beat them into a mass with syrup.

Medical properties.—Expectorant, and diuretic. Dose ℈ß. to grs. xv.

Pilulæ subcarbonatis sodæ. Edinburgh.—Pills of subcarbonate of soda.

Take of exsiccated subcarbonate of soda four parts, hard soap three parts. Beat into a mass with simple syrup.

Medical properties.—Lithontriptic and diuretic. Dose grs. xv. to ℈j.

Pilulæ sulphatis ferri compositæ. Edinburgh.—Compound pills of sulphate of iron.

Take of sulphate of iron reduced to powder one ounce, extract of chamomile flowers one ounce and a half, oil of peppermint a drachm. Beat, with simple syrup, into a mass. Dose grs. v.

TROCHISCI.—Troches.

The London and the Dublin colleges have rejected these preparations.

Trochisci carbonatis calcis. Edinburgh.—Troches of carbonate of lime.

Take of prepared carbonate of lime four ounces, acacia gum one ounce, nutmegs one drachm, refined sugar six ounces. Rub them into powder, and form them into a mass fit for making troches by means of water.

Medical properties.—Antacid: but their effects are in some measure counteracted by the sugar.

Trochisci carbonatis magnesiæ. Edinburgh.—Troches of carbonate of magnesia.

Take of carbonate of magnesia six ounces, refined sugar three ounces, nutmegs a scruple. Beat them into a powder, and make them up into troches with tragacanth mucilage.

Medical properties.—Antacid and aperient.

Trochisci glycyrrhizæ glabræ. Edinburgh.—Troches of liquorice.

Take of extract of liquorice, gum arabic, of each one part, refined sugar two parts, boiling water a sufficient quantity. Dissolve and strain; then evaporate the solution by a gentle heat to a consistence proper for making troches.

Medical properties.—Demulcent.

Trochisci glycyrrhizæ cum opio. Edinburgh.—Liquorice troches with opium.

Take of opium two drachms, tincture of balsam of Tolu half an ounce, simple syrup eight ounces, extract of liquorice softened by hot water, gum arabic in powder, of each five ounces. First rub well the opium with the tincture; then gradually add the syrup and the extract; afterwards sprinkle in the powder of gum arabic; Lastly, the mass is to be dried and formed into troches of ten grains weight.

Medical properties.—The same as the last.

Trochisci gummosi. Edinburgh.—Gum troches.

Take of gum arabic four parts, starch one part, refined sugar twelve parts. Rub the whole into powder, and with rose make it up into a mass proper for forming troches.

Trochisci nitratis potassæ. Edinburgh.—Troches of nitrate of potassa.

Take of nitrate of potassa one part, refined sugar three parts. Beat them into powder, and form a mass fit for making troches, by means of tragacanth mucilage.

Medical properties.—Refrigerant. Dose two or three troches.

PREPARATA EX ANIMALIBUS.—Preparations from animals.

Adeps præparata. London.—Prepared fat.

Cut the fat into small fragments; then melt it with a gentle heat, and press it through linen.

Sevum præparatum. London.—Prepared suet.

Cut the suet into pieces; then melt it with a gentle heat, and press it through linen.

Cornu ustum. London.—Burnt hartshorn.

Burn pieces of hartshorn in an open fire until they become thoroughly white; then powder them, and prepare them in the manner ordered for the preparation of chalk.

Medical properties.—Exceedingly questionable.

Spongia usta. London.—Burnt sponge.

Cut sponge into small pieces, and bruise it in order to free it from any adhering extraneous substances; then burn it in a covered iron vessel till it become black and friable. Finally, let it be rubbed into a very fine powder.

Iodine and subcarbonate of soda are the active ingredients in burnt sponge.

Medical properties.—Deobstruent and tonic. Used especially in bronchocele. Dose from ʒj. to ʒij. or more, mixed with honey or other materials in the way of an electuary.

Testæ præparatæ. London.—Prepared shells.

Wash the shells with boiling water, having first freed them from extraneous matters; then prepare them in the manner directed for the preparation of chalk.

This preparation is superfluous.

EMPLASTRA.—Plasters.

Emplastrum ammoniaci. London. Edinburgh.—Ammoniacum plaster.

Take of purified ammoniacum five ounces, diluted acetic acid half a pint. Dissolve the ammoniacum in the vinegar; then evaporate the solution in an iron vessel, assiduously stirring it until it become of a due consistence.

Medical properties. Resolvent. Useful in indolent tumors.

Emplastrum ammoniaci cum hydrargyro. London.—Ammoniacal plaster with mercury.

Take of purified ammoniacum a pound, purified mercury three ounces, sulphureted oil a fluid drachm. Rub the mercury with the sulphureted oil until the globules no longer appear; then gradually add the ammoniacum previously melted, and mix the whole together.

Medical properties.—Resolvent and discutient. Applicable to indolent swellings.

Emplastrum assafœtidæ. Edinburgh.—Assafœtida plaster.

Take of plaster of semivitreous oxide of lead, assafœtida, of each two parts; galbanum, yellow wax, of each one part.

Medical properties.—Antispasmodic and stimulant.

Emplastrum ceræ. London.—Wax plaster.

Take of yellow wax, prepared suet, of each three pounds; yellow resin a pound. Let them be melted together and strained.

Emplastrum simplex. Edinburgh.—Simple plaster.

Take of yellow wax three parts; mutton suet and white resin, of each two parts. Seldom employed.

Emplastrum cumini. London. Cumin plaster.

Take of cumin seeds, carraway seeds, laurel berries, of each three ounces; dried pitch three pounds; yellow wax three ounces. Let the pitch and the wax be melted together; then add the dry ingredients in powder so as to form a proper consistence.

Emplastrum galbani compositum. London.—Compound galbanum plaster.

Take of purified galbanum eight ounces, lead plaster three pounds, common turpentine ten drachms, resin of the spruced fir powdered three ounces. The galbanum and the turpentine having been mixed together, add first the resin and then the lead plaster previously melted by a slow fire, and mix the whole together.

Emplastrum gummosum. Edinburgh.—Gum plaster.

Take of plaster of semivitreous oxide of lead eight parts; ammoniacum, gum resin, galbanum, yellow wax, of each one part. Add the gum resin to the plaster and wax while melted, and mix.

Emplastrum hydrargyri. London.—Mercurial plaster.

Take of purified mercury three ounces, sulphureted oil a fluid drachm, lead plaster a pound. Rub the mercury with the sulphureted oil until globules no longer appear; then by degrees add the lead plaster, and mix the whole.

Edinburgh.—Take of olive oil, resin, of each one part; mercury three parts; plaster of semivitreous oxide of lead six parts. Rub the mercury with the oil and resin previously melted together and cooled until the globules disappear; then gradually add the plaster of semivitreous oxide of lead melted, and carefully mix the whole together.

Medical properties.—Discutient. Especially applicable to old syphilitic affections.

Emplastrum cantharidis. London.—Blistering plaster.

Take of blistering flies rubbed to a very fine powder a pound, wax plaster a pound and a half, prepared lard a pound. Melt the plaster and the lard together; and, having removed them from the fire just before they become solid, sprinkle in the blistering flies, and mix the whole together.

Emplastrum cantharidis vesicatoriæ. Edinburgh.—Blistering plaster.

Take of mutton suet, wax, white resin blistering plaster rubbed to a very fine powder, of each equal weights. Mix the powder with the other articles previously melted together and removed from the fire; then stir till the mixture stiffens in cooling.

Emplastrum cantharidis vesicatoriæ compositum. Edinburgh.—Compound plaster of Spanish flies.

Take of Venice turpentine eighteen parts; Burgundy pitch, blistering flies, of each twelve parts, yellow wax four parts; subacetate of copper two parts; white mustard seed, black pepper, of each one part. Melt the Burgundy pitch and the wax, and add the turpentine to them. While these remain warm after being melted, sprinkle in the other ingredients reduced to fine powder, and mix, constantly stirring, so as to form a plaster. More active and immediate in its operation than the common blistering plaster.

Emplastrum opii. London. Edinburgh.—Plaster of opium.

Take of hard opium powdered half an ounce, resin of the spruce fir powdered three ounces, lead plaster a pound. Melt the plaster and the resin together, then let the opium be added, and the whole mixed.

Medical properties.—Anodyne and antirheumatic.

Emplastrum oxidi ferri rubri. Edinburgh.—Plaster of red oxide of iron.

Take of plaster of semivitreous oxide of lead twenty-four parts, white resin six parts, yellow wax, olive oil, of each three parts, red oxide of iron eight parts. Rub the red oxide of iron with the oil, and adding the other ingredients melted, let the whole be well mixed.

Medical properties.—Supposed tonic.

Emplastrum picis compositum. London.—Compound pitch plaster.

Take of Burgundy pitch two pounds; resin of the spruce fir a pound; yellow resin, yellow wax, of each four ounces; expressed oil of nutmeg an ounce; olive oil, water, of each two fluid ounces. To the pitch, resin, and wax, melted together, first add the resin of the spruce fir, then the oil of nutmeg, the olive oil, and the water. Mix the whole and reduce it to a due consistence.

Medical properties.—Stimulant and rubefacient.

Emplastrum plumbi. London.—Lead plaster.

Take of semivitreous oxide of lead rubbed to a very fine powder five pounds, olive oil a gallon, water two pints. Boil them together over a slow fire, constantly stirring, until the oil and oxide unite into the consistence of a plaster. It will, however, be necessary to add a little boiling water, if that which was employed in the beginning shall have been consumed before the completion of the process.

Emplastrum oxidi plumbi semivitrei. Edinburgh.—Plaster of semivitreous oxide of lead.

Take of the semivitreous oxide of lead one part, olive oil two parts, water a sufficient quantity. Boil them, constantly stirring, until the oil and the oxide combine into a plaster.

Medical properties.—Principally employed for mechanical support and defence.

Emplastrum resinæ. London.—Resin plaster.

Take of yellow resin half a pound, lead plaster three pounds. Melt the lead plaster with a gentle heat, then add the resin powdered and mix.

Emplastrum resinosum. Edinburgh.—Resinous plaster.

Take of plaster of semivitreous oxide of lead five parts, resin one part. Melt them with a gentle heat; then continue stirring the liquor until it become stiff in cooling.

Medical properties.—Principally adhesive.

Emplastrum saponis. London.—Soap plaster.

Take of hard soap sliced half a pound, lead plaster three pounds. Mix the soap with the melted plaster; then boil it down to a due consistence.

Emplastrum saponaceum. Edinburgh.—Soap plaster.

Take of semivitreous oxide of lead four parts, gum plaster two parts, soap sliced one part. Mix the soap with the plasters melted together; then boil them a little so as to form plaster.

Medical properties.—Discutient, but less efficacious than the mercurial plaster.

CERATA.—Cerates.

Substances intermediate between plasters and ointments.

Ceratum simplex. London.—Cerate.

Take of olive oil four fluid ounces, yellow wax four ounces. Add the oil to the melted wax, and mix.

Medical properties.—Emollient: used for excoriations.

Ceratum calaminæ. London.—Calamine cerate.

Take of prepared calamine, yellow wax, of each half a pound, olive oil a pint. Mix the oil with the melted wax; then let the mixture be taken from the fire, and so soon as it begins to thicken add the calamine, constantly stirring, until it be cold.

Ceratum carbonatis zinci impuri. Edinburgh.—Cerate of impure carbonate of zinc.

Take of simple cerate five parts, prepared impure carbonate of zinc one part. Mix.

Medical properties.—Useful for excoriations, burns, &c. They have been called Turner's cerate.

Ceratum cetacei. London.—Spermaceti cerate.

Take of spermaceti half an ounce, white wax two ounces, olive oil four fluid ounces. Let the spermaceti and the wax be melted together; then add the oil and stir them until they are cold.

Ceratum simplex. Edinburgh.—Simple cerate.

Take of olive oil six parts, white wax three parts, spermaceti one part. Let the wax and the spermaceti be melted in the oil with a gentle heat; then constantly stir until the mixture stiffen in cooling.

Ceratum cantharidis. London.—Cerate of blistering flies.

Take of spermaceti cerate six drachms, blistering flies rubbed to a very fine powder a drachm. Add the blistering flies to the cerate softened by the fire, and mix them together.

Medical properties.—Employed to keep open blistered surfaces.

Ceratum plumbi acetatis. London.—Cerate of acetate of lead.

Take of acetate of lead in powder two drachms, white wax two ounces, olive oil half a pint. Melt the wax in seven fluid ounces of the oil; then add gradually the acetate, separately rubbed down with the remaining oil, and stir with a wooden spatula until the mass be thoroughly formed.

Medical properties.—Exceedingly useful for burns and excoriations.

Ceratum plumbi compositum. London.—Compound cerate of lead.

Take of solution of acetate of lead two fluid ounces and a half, yellow wax four ounces, olive oil nine fluid ounces, camphor half a drachm. Melt the wax and mix it with eight fluid ounces of the oil; then let them be removed from the fire, and as soon as they begin to thicken add gradually the solution of acetate of lead, and stir assiduously with a wooden spatula until they be cold. Lastly, mix the camphor dissolved in the remainder of the oil.

Medical properties.—The same as the last. It is called Goulard's cerate.

Ceratum resinæ. London.—Resin cerate.

Take of yellow resin, yellow wax, of each a pound, olive oil a pint. Melt together the resin and the wax by a slow fire; then add the oil and strain the cerate while it is hot through a linen cloth.

Unguentum resinosum. Edinburgh.—Resinous ointment.

Take of hogs' lard eight parts, resin five parts, yellow wax two parts. Melt the whole by a gentle heat, and stir the mixture until it become stiff in cooling.

Medical properties.—Stimulant and detergent.

Ceratum sabinæ. London.—Cerate of savine.

Take of the fresh leaves of savine bruised a pound, yellow wax half a pound, prepared lard two pounds. Melt together the lard and the wax and boil the savine leaves in the mixture; then strain through a linen cloth.

Medical properties.—Stimulant. It is used to keep open blisters when the cantharides are thought too stimulating.

Ceratum saponis. London.—Soap cerate.

Take of hard soap eight ounces, yellow wax ten ounces, semivitreous oxide of lead powdered a pound, olive oil a pint, vinegar a gallon. Boil the vinegar or the oxide of lead over a slow fire, gently stirring until they incorporate; then add the soap and boil again in the same manner until the moisture be entirely evaporated; lastly, let the wax previously melted be mixed with the oil.

Medical properties.—This is properly a cerate of acetate of lead. It is a cooling dressing to inflamed surfaces.

UNGUENTA.—Ointments.

Unguentum acidi nitrosi. Edinburgh.—Ointment of nitrous acid.

Take of hogs' lard one pound, nitrous acid six drachms. Mix gradually the acid with the melted lard, and assiduously as it cools beat the mixture.

Medical properties.—It has been employed in ulcers of a syphilitic and herpetic kind.

Unguentum cetacei. London.—Spermaceti ointment.

Take of spermaceti six drachms, white wax two drachms, olive oil three fluid ounces. Melt them together over a gentle fire, and stir them constantly until they be cold.

Medical properties.—Healing and emollient.

Unguentum elemi compositum. London.—Compound ointment of elemi.

Take of elemi a pound, common turpentine ten ounces, prepared suet two pounds, olive oil two fluid ounces. Melt the elemi with the suet, then let it be taken from the fire, and immediately mix in the turpentine and the oil. Lastly, strain the liquor through a linen cloth.

Medical properties.—Stimulant and digestive.

Unguentum hydrargyri fortius. London.—Strong mercurial ointment.

Take of purified mercury two pounds, prepared lard twenty-three ounces, prepared suet one ounce. First rub the mercury with the suet and a little of the lard until there be no appearance of globules, then add the remainder of the fat and mix.

Unguentum hydrargyri. Edinburgh.—Mercurial ointment.

Take of mercury, mutton suet, of each or part, hogs' lard three parts. Rub the mercury diligently in a mortar with a little of the hogs' lard, until there be no appearance of globules; then add the remainder of the lard. It may also be made with double or triple the quantity of mercury.

Unguentum hydrargyri mitius. London.—Milder mercurial ointment.

Take of the stronger mercurial ointment a pound, prepared lard two pounds. Mix them.

Medical properties.—It is used in friction for the same purposes with which mercury is given by the mouth when specific effects are required. Quantity for friction ʒj. night and morning. As in the case of the pilulæ hydrargyri so even here there are doubts whether the mercury is in a degree oxidised, or only mechanically divided.

Unguentum oxidi hydrargyri cinerei. Edinburgh.—Ointment of gray oxide of mercury.

Take of gray oxide of mercury one part, hog's lard three parts. Mix. Not much employed.

Unguentum hydrargyri nitratis. London.—Ointment of nitrate of mercury.

Take of purified mercury one ounce, nitric acid eleven fluid drachms, prepared lard six ounces, olive oil four fluid ounces. First dissolve the mercury in the acid; then while it is hot mix the solution with the lard and oil melted together.

Unguentum nitratis hydrargyri fortius, vulgò unguentum citrinum. Edinburgh.—Stronger ointment of nitrate of mercury.

Take of purified mercury one part, nitrous acid two parts, olive oil nine parts, hogs' lard three parts. Dissolve the mercury in the acid; then beat up the solution strongly in a glass mortar, with the lard and oil previously melted together and nearly cold, so as to make an ointment.

Unguentum nitratis hydrargyri mitius. Edinburgh.—Milder ointment of nitrate of mercury.

It is made in the same way as the stronger with a triple portion of oil and lard.

Medical properties.—These ointments are stimulant and detergent. They are useful in several chronic eruptions of the skin and in scrofulous affections of the eyelids.

Unguentum gallæ. London.—Ointment of galls.

Take of galls in fine powder one part, lard eight parts. Mix.

Medical properties.—Useful in piles.

Unguentum hydrargyri nitrico-oxydi. London.—Ointment of nitric oxide of mercury.

Take of nitric oxide of mercury one ounce, white wax two ounces, prepared lard six ounces. Melt the wax and the lard together; then add the nitric oxide of mercury in very fine powder, and mix.

Unguentum oxidi hydrargyri rubri. Edinburgh.—Ointment of red oxide of mercury.

Take of red oxide of mercury by nitric acid in fine powder one part, hogs' lard eight parts. Mix.

Medical properties.—Stimulant and detergent.

Unguentum hydrargyri præcipitati albi. London.—Ointment of white precipitate of mercury.

Take of white precipitate of mercury a drachm, prepared lard an ounce and a half. Add the precipitated mercury to the lard previously melted with a gentle heat, and mix.

Medical properties.—Useful in itch and other cutaneous affections, where sulphur is objected to.

Unguentum cantharidis. London.—Blistering ointment.

Take of blistering flies finely powdered two ounces, distilled water eight fluid ounces, resin cerate eight ounces. Boil the water with the blistering flies down to half its quantity, and strain. Mix the cerate with the strained liquor and evaporate to a due consistence.

Unguentum infusi cantharidis vesicatoriæ. Edinburgh.—Ointment of infusion of blistering flies.

Take of blistering flies, resin, yellow wax, of each one part; Venice turpentine, hogs' lard, of each two parts; boiling water four parts. Macerate the flies in the water during one night, and strain the liquor with strong expression; add the liquor to the fat, and boil until the water be evaporated; then add the wax and resin, and these being melted remove the liquor from the fire; add the Venice turpentine, and mix. These are injudicious preparations.

Unguentum juniperi sabinæ. Edinburgh.—Ointment of savine.

Take of fresh leaves of savine two parts, yellow wax one part, lard four parts. Melt the wax and lard together, then boil the leaves in the mixture, and express through a cloth. Used for keeping blistered surfaces open.

Unguentum carbonatis plumbi. Edinburgh.—Ointment of carbonate of lead.

Take of simple ointment five parts, carbonate of lead one part. Mix.

Medical properties.—A cooling desiccative ointment.

Unguentum oxidi zinci impuri. Edinburgh.—Ointment of impure oxide of zinc.

Take of simple liniment five parts, prepared impure oxide of zinc one part. Mix. Not at present much employed.

Unguentum picis liquidæ. London.—Tar ointment.

Take of tar, prepared suet, of each a pound. Melt them together, and strain the mixture through a linen cloth.

Edinburgh.—Take of tar five parts, yellow wax two parts. Melt the wax with a gentle heat; then add the tar, and stir until the mixture become stiff in cooling.

Medical properties.—Detergent and stimulant.

Unguentum picis nigræ. London.—Ointment of black pitch.

Take of black pitch, yellow resin, of each nine ounces; olive oil one pint. Let them be melted together and strained through black cloth.

Medical properties.—Digestive and stimulant.

Unguentum pulveris cantharidis vesicatoriæ. Edinburgh.—Ointment of the powder of blistering flies.

Take of resinous ointment seven parts, powdered blistering flies one part. Sprinkle the powder into the melted ointment, and stir the mixture until it stiffen in cooling.

Medical properties.—Used to keep blistered surfaces open.

Unguentum resinæ nigræ. London.—Black resin ointment.

Take of black resin, yellow wax, yellow resin, of each nine ounces; olive oil a pint. Melt them together, and strain through a linen cloth.

Unguentum sambuci. London.—Elder ointment.

Take of elder flowers, prepared lard, of each two ounces. Boil the elder flowers in the lard until they become crisp; then let the ointment be strained through a linen cloth.

Merely simple ointments, and therefore useless preparations.

Unguentum simplex. Edinburgh.—Simple ointment.

Take of olive oil five parts, white wax two parts. Melt the wax in the oil; then stir the mixture until it become stiff in cooling.

Unguentum subacetatis cupri. Edinburgh.—Ointment of subacetate of copper.

Take of resinous ointment fifteen parts, subacetate of copper one part. Sprinkle the subacetate into the melted ointment, and stir until the mixture become stiff in cooling.

Medical properties.—Detergent and escharotic.

Unguentum sulphuris. London.—Sulphur ointment.

Take of sublimed sulphur three ounces, prepared lard half a pound. Mix.

Edinburgh.—Take of hog's lard four parts, sublimed sulphur one part. Mix.

Medical properties.—Specific in itch.

Unguentum sulphuris compositum. London.—Compound ointment of sulphur.

Take of sublimed sulphur half a pound, white hellebore root in powder two ounces, nitrate of potassa a drachm, soft soap half a pound, prepared lard a pound and a half. Mix.

Medical properties.—The same but more stimulant than the last.

Unguentum veratri. London.—Ointment of white hellebore.

Take of white hellebore root in powder two ounces, prepared lard eight ounces, oil of lemon twenty minims. Mix.

Medical properties.—Less certain for the cure of itch than the sulphur ointment.

Unguentum zinci. London —Zinc ointment.

Take of oxide of zinc one ounce, prepared lard six ounces. Mix.

Unguentum oxidi zinci. Edinburgh.—Ointment of oxide of zinc.

Take of simple liniment six parts, oxide of zinc one part. Mix.

Medical properties.—Astringent and healing.

Linimenta.—Liniments.

Linimentum æruginis. London. Liniment of verdigris.

Take of verdigris powdered an ounce, vinegar seven fluid ounces, clarified honey fourteen ounces. Let the verdigris be dissolved in the vinegar, and the solution strained through a linen cloth; then, having added the honey, boil the mixture to a due consistence.

Medical properties. Detergent and escharotic, not much used.

Linimentum ammoniæ fortius. London. Stronger liniment of ammonia.

Take of solution of ammonia a fluid ounce, olive oil two fluid ounces. Shake them together until a union is formed.

Oleum ammoniatum. Edinburgh. Ammoniated oil.

Take of olive oil eight parts, water of ammonia one part. Mix.

Medical properties. Rubefacient. Useful in chronic rheumatism.

Linimentum ammoniæ subcarbonatis. London. Liniment of subcarbonate of ammonia.

Take of solution of subcarbonate of ammonia a fluid ounce, olive oil three fluid ounces. Shake them together so as to form a union.

Linimentum aquæ calcis, sive oleum lini cum calce. Edinburgh. Liniment of lime water.

Take of linseed oil, lime-water, of each equal parts. Mix.

Medical properties.—Useful for burns and scalds.

Linimentum camphoræ. London.—Liniment of camphor.

Take of camphor half an ounce, olive oil two fluid ounces. Dissolve the camphor in the oil.

Oleum camphoratum. Edinburgh.—Camphorated oil.

Take of olive oil four parts, camphor one part. Mix so as to dissolve the camphor.

Medical properties.—Useful in glandular swellings and in chronic rheumatism. In cases of deafness arising from hardened wax it will be often useful to put some of this oil at night into the ear by means of cotton or lint.

Linimentum camphoræ compositum. London.—Compound liniment of camphor.

Take of camphor two ounces, solution of ammonia six fluid ounces, spirit of lavender a pint. Mix the solution with the spirit; then distil a pint with a gentle heat from a glass retort. Lastly, dissolve the camphor in this distilled liquor.

Medical properties.—Stimulant and rubefacient.

Linimentum hydrargyri. London.—Liniment of mercury.

Take of the stronger mercurial ointment, prepared lard, of each four ounces; camphor an ounce; rectified spirit fifteen minims; solution of ammonia four fluid ounces. First rub the camphor with the spirit, then with the lard and mercurial ointment. Lastly, drop gradually in the solution of ammonia and let the whole be mixed.

Medical properties.—Stimulant and discutient, especially of chronic affections of the syphilitic kind.

Linimentum saponis compositum. London.—Compound soap liniment.

Take of hard soap three ounces, camphor one ounce, spirit of rosemary a pint. Dissolve the camphor in the spirit; then add the soap, and macerate in the heat of a sand-bath, till a solution be effected.

Tinctura saponis camphorata, vulgò *linimentum saponaceum.* Edinburgh.—Camphorated tincture of soap, commonly called liniment of soap.

Take of hard soap sliced four ounces, camphor two ounces, volatile oil of rosemary half an ounce, alcohol two pounds. Let the soap be digested in the alcohol during three days; then add the camphor and the oil, frequently shaking the mixture.

Medical properties.—Stimulant and anodyne.

Tinctura saponis et opii, vulgò *linimentum anodynum.* Edinburgh.—Tincture of soap and opium, commonly called anodyne liniment.

Take of hard soap sliced four ounces, opium one ounce, camphor two ounces, oil of rosemary half an ounce, alcohol two pounds. Let the soap be digested in the alcohol for three days; then to the strained solution add the camphor and the oil, frequently shaking the mixture.

Medical properties.—Stimulant and anodyne.

Linimentum terebinthinæ. London.—Turpentine liniment.

Take of cerate of resin a pound, oil of turpentine half a pint. Melt the cerate; then add the oil of turpentine, and mix.

Medical properties.—An excellent application to recent burns and scalds.

Cataplasmata.—Cataplasms.

Cataplasma fermenti. London.—Yeast cataplasm.

Take of flour a pound, yeast of beer half a pint. Mix, and expose the mixture to a gentle heat till it begin to swell.

Medical properties.—A corrector of foul ulcers, by virtue of the carbonic acid gas that is evolved.

Cataplasma sinapis. London.—Cataplasm of mustard.

Take of mustard seed, linseed, of each in powder half a pound; hot vinegar a sufficient quantity. Mix them to the consistence of a cataplasm.

Medical properties.—Stimulant, rubefacient and often vesicatory.

PART III.

The principal Formulæ of Magendie and others, and some which have been recently introduced into the Pharmacopœia of the Dublin College, and others employed in the United States of America.

In the application of chemistry to pharmaceutic and medical purposes much has recently been done towards ascertaining the precise principles upon which medicinal efficacy manifests itself; and many new remedies have been proposed and brought into practice, more especially among the French chemists by separating one portion from another, of a particular substance,—this separated portion being in several instances conceived to be that upon which the whole virtue of the material had depended. Concentration, elegance, and increase of effect, have thus been occasionally introduced into medicine, and much consequent good has resulted; in some instances, indeed, we may consider the proposed improvements to be questionable; for fact it is, as well pointed out by Dr. Paris in his Pharmacologia, that even the inert woody fibre of many vegetables when in combination with other of their principles becomes active, so that we may be misled in supposing that by an extraction and separation of a medicinal principle we extract and separate the whole of medicinal property.

Another objection may be taken against the new medicinals as it refers to their nomenclature; for in some instances the concentrated principles are named from their medicinal effects, as in the case of narcotine, while in others botanic, or chemical, or natural history principles regulate the appellation,—but the science of extraction, in the way now referred to, may be regarded in its infancy, and time with more mature consideration will doubtless effect still more improvement of it.

The principal of the medicinal substances thus introduced are the following:

Strychnine and *brucine*, two peculiar vegetable alkalies, discovered by Messrs. Pelletier and Caventou, which exist in a state of combination with an acid called the igazuric, in the nux vomica, St. Ignatius's bean; the upas tieute of Java, and the snake wood, which separately and together are described as possessing the remarkable property of exciting strongly the spinal marrow without affecting, excepting indirectly, the functions of the brain, and as therefore being highly efficacious in some species of paralysis.

Morphine, a principle afforded by opium, and which, as well as by other means, may be obtained by treating opium with caustic ammonia, which is said to be the narcotic principle of the drug, and the salts of which are alleged to possess all the good properties of opium without its inconveniences.

Narcotine, one of the immediate principles likewise of opium, possessed of properties like those of morphine, but less powerful.

Emetine. 'M. M. Pelletier, and Magendie presented a memoir to the Academie des Sciences

in 1817, in which it was announced as the result of a course of experiments, that the power of the various species of ipecacuanha depended on a peculiar principle denominated emetine, and that this substance being much more active than the ipecacuanha itself, without possessing either its disagreeable taste or nauseous smell, might on all occasions be substituted for it with advantage.' Pure emetine appears to be a new vegetable alkali.

Quinine and cinchonine.—The gray bark was found to yield cinchonine, a peculiar alkaline principle, while 'the yellow bark furnished an alkali, which, though in many respects resembling the other, differed in certain properties too remarkable to admit of their being confounded; this latter, therefore, its discoverers denominated quinine.'

Veratrine.—'We owe our knowledge of this substance also to M. M. Pelletier and Caventou. These indefatigable chemists had remarked that in the veratrican tribe, almost all the individuals besides the botanical characters possessed a distinctive and very acrid taste, while they produced a similar action on the animal economy. They accordingly conceived that it would be interesting to ascertain whether such properties did not reside in some particular substance common to all these plants. These conjectures were confirmed by an analysis of the seeds of the veratrum sabadilla, by which they separated the acrid principle, recognising in it all the alkaline properties. They afterwards detected it in the bulb of the colchicum autumnale, in that of the veratrum commune, or white hellebore; and named it veratrine from the family denomination belonging to the plant.'

Solanine.—The discoverer of this principle in two plants of the family of the solaneæ, the solanum nigrum and the solanum dulcamara, was M. Desfossé's, at Besançon. This principle possesses both narcotic and emetic powers, but the latter more decidedly and conspicuously than the former.

Delphine.—This alkali was detected in 1819 in the seeds of the delphinium staphisagria by M. M. Feneulle and Lassaigne, who thus named it from a belief that the acrid properties of the whole family depended upon this principle—an opinion, however, which has not been confirmed by the analysis of other plants belonging to it. The medicinal properties of delphine have not been much tried.

Gentianine.—'A very singular circumstance is connected with the discovery of this principle. M. M. Henry and Caventou were both employed at the same time, and without any knowledge of each other's proceedings, upon the analysis of gentian; and arrived at results so perfectly identical that, upon comparing notes, they found the appearance of co-operation so striking that they resolved to promulgate their labors together.' The principle obtained from the gentian and its action is that of a highly concentrated bitter, especially, it is said, applicable to scrofulous affections.

Iodine.—For an account of the discovery of this substance see the article CHEMISTRY. Its physical and medicinal properties are conspicuously directed to the glandular organisation and system, and it has been employed in scrofula with reputed success.

Lupuline.—Dr. Ives of New York has the credit of discovering this principle as resident in the humulus lupulus. It is said to be aromatic, tonic, and narcotic. Some, however, have doubted its pretensions.

Piperine.—'This substance was discovered in the black pepper by M. Ærstaedt,' by whom it was supposed to be a vegetable alkali, but other experiments have tended to disprove this. It has lately been employed in Italy as a febrifuge.

Besides these principles, and time may probably add to their number rapidly, several new substances and combinations of substances have been introduced into the more recent pharmacopœias; and Dr. Thomson has availed himself of these additions in a very useful work he has published under the name of a Conspectus of the Pharmacopœias: what follows will be principally compiled from that publication; the articles to which the letter D is attached are from the last edition of the Dublin Pharmacopœia; those to which U. S. are added are from the order of the United States; and the others are French preparations.

Acetum opii. U. S.—Vinegar of opium.

Opium half a pound, vinegar three pints, bruised nutmeg one ounce and a half, saffron half an ounce, sugar four ounces, yeast a fluid ounce. Boil the first mentioned articles to a proper consistence; then add the sugar and yeast. Digest for seven weeks, and then decant, filter, and bottle up, adding a little sugar to each bottle.

Medical properties.—Anodyne. Dose from ♏v. to ♏xx.

Cinchonina (cinchonine).—Cinchonia. Dr. T. prefers the termination of these words in *a*.

Take any quantity of powder of cinchonia lancifolia; boil it in alcohol until it lose all bitterness, and distil the tincture to dryness. Dissolve the residue in boiling water acidulated with muriatic acid; then add an excess of magnesia, and boil for some minutes. Filtrate when cold, wash the magnesian residue with cold water, and dry it in a stove; then digest repeatedly in boiling alcohol, and mix the alcoholic liquors, which in cooling will yield crystals of cinchonia.

Medical properties.—In all cases in which bark is useful. Dose from gr. ij. to ℈ß.

Cyanuretum hydrargyri. D.—Cyanuret of mercury.

Take of the cyanuret of iron six parts, nitric oxide of mercury five parts, distilled water forty parts. Let the cyanuret of iron and oxide of mercury be mixed together, then add the hot water. Let the mixture be boiled for half an hour stirring it all the time, and then filter through blotting paper. Let the residue be well washed with distilled water. Finally evaporate the filtered solutions, and crystallise in cooling.

Medical properties.—The same as those of hydrocyanic acid, but more fitted for external application.

Decoctum calumbæ compositum. U. S.—Compound decoction of Calumba.

Take of bruised Calumba root, quassia shavings, of each two drachms, orange peel one drachm, powdered rhubarb a scruple, carbonate of potassa half a drachm, water twenty fluid

ounces. Boil down to a pint, and add half a fluid ounce of tincture of lavender.

Medical properties. A tonic in convalescence from fever. Dose f. ℥.

Decoctum pyrolæ. D.—Decoction of winter green.

Take of pyrola umbellata one ounce, water by measure two pounds. Macerate for six hours, then bruise and return the pyrola to the liquor, and reduce the mixture by evaporation, when strained and expressed, to a pound by measure.

Medical properties.—Highly diuretic. Dose from f. ℥j. to f. ℥ij.

Decoctum scillæ. U. S.—Decoction of squill.

Take of squill three drachms, juniper berry four ounces, seneka root three ounces, water four pints. Boil to one-half, then strain, and add spirit of nitric ether four fluid ounces.

Medical properties.—Diuretic. Dose from f. ℥j. to f. ℥ij.

Emetina.—Emetine.

Take of powdered root of ipecacuanha any quantity: digest it several times in ether at 60° Fahrenheit, and then in alcohol. Evaporate the alcoholic tincture in a water-bath, and disolve the residūe in cold water; then add magnesia and macerate; and, after drying the magnesian precipitate, digest it in pure alcohol, and evaporate the solution to dryness.

Medical properties. Emetic, narcotic, purgative. Dose from one third of a grain to grs. iij. in any bland fluid.

Incompatibles. Preparations of nutgalls, and all vegetable astringent infusions or decoctions.

Extractum nucis vomicæ. D.—Extract of nux vomica.

Take of rasped nux vomica eight ounces, proof spirit of wine by measure two pounds. Digest in a covered vessel for three days, strain the liquor, and express what remains in a press; to this residue add a pound and a half of proof spirit, digest for three days, and express the residue. Consume the mixed liquors by distillation, and reduce to a proper consistence.

Medical properties.—Antiparalytic. Dose gr. ¼ to gr. iß.

Ferri prussias. U. S.—Prussiate of iron. Prussian blue, composed of Prussic acid 35·1, red oxide of iron 53, water 11·9 in 100 parts.

Medical properties —Tonic and antispasmodic. In intermittents, scrofula, chorea, and epilepsy. Dose grs. iij. to grs. viij. in syrup thrice a day.

Hydriodas potassæ. D.—Hydriodate of potassa.

Take of iodine one part, sulphuret of iron in coarse powder five parts, sulphuric acid seven parts, distilled water forty-eight parts, water of carbonate of potassa as much as necessary, rectified spirits six parts. Mix the iodine by aid of friction with sixteen parts of the water, and pour the mixture into a glass vessel. Pour the acid diluted with thirty-two parts of the water upon the sulphuret, put into a matrass, and by a tube fitted to the neck of the matrass, and reaching to the bottom of the vessel containing the iodine and water, let the gas pass through the mixture until the iodine altogether disappears. Evaporate the strained liquor immediately with a greater heat, and strain it again. Then add enough of the solution of carbonate of potassa to saturate the acid, which is known by the effervescence ceasing. Then expose the mixture to a gentle heat until the residuary salt become dry and of a white color: pour the spirit upon this, and dissolve with heat. Finally evaporate the liqour poured off from the residuary salt, and having evaporated it to dryness let it be preserved in a stopped bottle.

Medical properties.—The same as iodine. Dose from gr. i. to grs. iij. of the dried salt; from ♏vj. to ♏xx. of the saturated solution. See *Iodine.*

Infusum cinchonæ cum succo limonum. U. S.—Infusion of cinchona with lemon juice.

Take of cinchona in powder one ounce, lemon juice two fluid ounces, compound tincture of camphor three fluid drachms, cold water a pint. Macerate for twelve hours in a covered vessel, and strain.

Medical properties.—Tonic when the stomach is too irritable to bear bark in the common way. Dose from f. ℥j. to f. ℥iij.

Infusum eupatorii.—Infusion of thorough wort.

Take of eupatorium one ounce, hot water a pint. Infuse for two hours in a covered vessel, and strain.

Medical properties. — Emetic, diaphoretic; tonic when given cold.

Iodinium.—Iodine. D. See CHEMISTRY.

Medical properties. — Stimulant, absorbent, and emmenagogue. Useful in bronchocele and other glandular swellings not of a schirrhous nature; to bring on menstruation in young females in whom it has not occurred; to assist the cicatrization of venereal ulcers. Dose from one-sixth of a grain to grs. iv. in pills, with crumb of bread.

Linimentum tabaci. U.S.—Liniment of tobacco.

Take of cut tobacco one ounce, lard one pound. Simmer the tobacco in the lard over a gentle fire until it become crisp, and strain.

Medical properties.—Useful in tinea, scabies, and in hemorrhoids.

Liquor labarraquii chloro-sodaicus.—Chlorosodaic solution of labarraque.

Dissolve grs. 2187·5 of pure crystallised carbonate of soda in f. ℥xx. of distilled water, and saturate the solution with chlorine gas.

Medical properties.—Antiseptic, astringent, tonic, used for disinfecting foul air, destroying animal putrefaction; an excellent lotion for chilblains, fetid ulcers, and gangrenous sores, and the best lotion in ptyalism yet discovered. Internally in dysentery. Dose from ♏xx. to f. ʒj. in a cupful of water; for a lotion or a gargle f. ʒxij. in f.℥vj. of distilled water.

Liquor morphinæ acetatis.—Solution of acetate of morphia.

Take of acetate of morphia sixteen grains, distilled water six fluid drachms, dilute acetic acid f. ʒij; mix.

Medical properties.—See *Morphinæ acetas.* Dose from ♏vj. to ♏xxxvj. in any bland vehicle.

Mistura strychninæ.—Mixture of strychnia.

Take of strychnia gr. i., white sugar two drachms, distilled water two fluid ounces; mix.

Medical properties.—See *Strychnine.* Dose

a dessert spoonful f. ʒij. every morning and evening.

Morphina (morphium). Morphia. Morphine.

Take a concentrated solution of opium, and boil it with magnesia in the proportion of ten grains for each pound of opium used. Filtrate and wash the deposit on the filter with cold rain or distilled water, and when it is dried digest it in a heat under 212° with weak alcohol. Filtrate and wash this deposit with a little cold alcohol; then boil it in a large quantity of rectified alcohol, and filtrate while the liquor is hot. The crystals are deposited as the liquor cools, and may be purified by repeated solutions and crystallisations. Robiquet's method.

Medical properties.—Sedative. Chiefly employed to prepare the salts of morphium. Dissolved in oil and rubbed on the skin it produces narcotic effects.

Morphiæ acetas.—Acetate of morphia.

Take of morphia four parts, distilled water eight parts. Mix them in a porcelain dish, and then add acetic acid, specific gravity 1·075, until litmus paper is slightly reddened. Evaporate slowly to dryness and reduce to powder (Codex Medicamentarius). It must be kept in a ground stoppered phial.

Medical properties.—Narcotic and sedative. Dose from gr. ¼ to gr. iij.

Morphiæ sulphas.—Sulphate of morphia.

Take of morphia six parts, distilled water twelve parts, sulphuric acid diluted with twice its bulk of water a sufficient quantity to saturate the morphia. Evaporate slowly and crystallise (Codex Medicamentarius). To be kept in a stoppered phial.

Medical properties. See *Morphia.* Dose from gr. i. to grs. iij.

Oleum chenopædii. U. S.—Oil of wormseed. Distil from the seed.

Medical properties.— Anthelmintic. Dose ♏v. to ♏x.

Oleum succini oxidatum. U. S.—Oxidated oil of amber.

Take oil of amber a fluid drachm, nitric acid three fluid drachms and a half. Put the oil of amber in a glass vessel, and gradually drop the acid into it, at the same time stirring the mixture with a glass rod. Let it stand for thirty-six hours, then separate the supernatant resinous matter from the acid fluid beneath, and wash it repeatedly first with cold and lastly with hot water, till the acid taste be removed.

Medical properties.—A substitute for musk.

Opii extractum narcotinâ privatum.—Extract of opium freed from narcotine.

Macerate coarsely powdered opium in cold water, filtrate and evaporate to the consistence of syrup; then digest in rectified ether, and repeat this as long as any crystals of narcotine appear in the residue of the distilled ether. Lastly, evaporate the solution which has been thus treated to an extract.

Medical properties.—Anodyne; without being stimulating. Dose gr. i. to gr. vj.

Quininæ sulphas. D.—Sulphate of quinine.

Take of the yellow bark (heart leaved) in coarse powder four pounds, distilled water by measure eight pounds, diluted sulphuric acid two ounces. Mix in a proper vessel and in a high temperature, agitating frequently; digest for four hours, then strain; the residue of the bark is then to be again mixed with an equal quantity of water and strained; this should be done three times. To the mixed solutions add a quantity of fresh burnt lime sufficient to saturate the acid. Separate the precipitate by means of blotting paper, and add to it three pints of rectified spirit, then digest with frequent agitation for six hours and strain; again digest the residuary powder with an equal quantity of rectified spirit and strain. Let this be done three times. Mix the spirituous solutions, and evaporate to dryness in a water-bath. To the residue add gradually as much diluted sulphuric acid as will make it just sensibly acid; then evaporate and crystallise.

Medical properties.—Powerfully tonic; especially useful in intermittent fever. Dose gr. i. to ℈ß.

Sulphas quininæ. See *Quininæ sulphas*, above.

Strychnina, strychnium.—Strychnia.

To a solution of extract of nux vomica in water add a solution of subacetate of lead as long as any precipitate is formed. Filtrate and separate any excess of the subacetate of lead from the solution by sulphureted hydrogen; then filtrate again and boil the solution with magnesia; wash the precipitate with cold distilled water, redissolve it in alcohol, and evaporate. The residue of the evaporation is strychnia, which may be purified by dissolving it in muriatic acid, and precipitating by means of magnesia.

Medical properties.—Antiparalytic in cases of paraplegia. Dose gr. 1/12 to gr. ⅛, made into pills with crumb of bread.

Syrupus cinchoninæ.—Syrup of cinchona.

Take of sulphate of cinchonia gr. xxxix. simple syrup sixteen fluid ounces. Dose f. ʒj. to f. ℥j.

Syrupus emetinæ.—Syrup of emeta.

Take of pure emeta gr. iv., simple syrup a pound; mix.

Medical properties.— In catarrh, hooping cough, and all cases in which ipecacuanha is useful.

Syrupus morphiæ acetatis.—Syrup of acetate of morphia.

Take of clarified syrup one pound, acetate of morphia four grains. Dose f. ʒj. to f. ʒij.

Syrupus morphiæ sulphatis.—Syrup of sulphate of morphia.

Take of clarified syrup one pound, sulphate of morphia four grains. Make into a syrup. Dose f. ʒj. to f. ʒiv.

Syrupus quininæ.—Syrup of quinine.

Take of sulphate of quinine forty-four grains. simple syrup two pounds, mix. Dose f. ʒij. to f. ʒiv.

Tinctura capsici et cantharidum. U. S.—Tincture of Cayenne pepper and blistering flies.

Take of cantharides bruised ten drachms, capsicum one drachm; diluted alcohol a pint. Digest for ten days and filter.

Medical properties.—Stimulant and rubefacient.

Tinctura cinchoninæ.—Tincture of cinchonia.

Take of sulphate of cinchonia eight grains; alcohol a fluid ounce. Dose f. ʒj. to f. ʒiv.

Tinctura iodinii. D.—Tincture of iodine.

Take of iodine two scruples; rectified spirit

a fluid ounce. Mix and dissolve the iodine by heat. Dose ♏x. to ♏xx.

Tinctura lobeliæ. U. S.—Tincture of Indian tobacco.

Take of Indian tobacco two fluid ounces, diluted alcohol a pint. Digest for ten days and filter.

Medical properties.—Emetic and expectorant. Dose f. ʒj. to f. ʒiij.

Tinctura nucis vomicæ. D.—Tincture of nux vomica.

Take of the fruit of the strychnus nux vomica rasped two fluid ounces, rectified spirit eight fluid ounces. Macerate for seven days, then strain.

Tinctura quininæ.—Tincture of quinia. Take of sulphate of quinia six grains, alcohol (specific gravity ·847) a fluid ounce. Dose f. ʒj. to f. ʒiij.

Tinctura sanguinariæ. U. S.—Tincture of blood root.

Take of bruised blood root two fluid ounces, alcohol a pint. Digest for ten days, and filter.

Medical properties.—Expectorant and tonic, and in large doses emetic. Dose ♏x. to f. ʒiß.

Tinctura strychninæ.—Tincture of strychnia.

Take of strychnia three grains, alcohol (specific gravity ·837) a fluid ounce. Dose ♏vi. to ♏xxiv.

Unguentum iodinii. D.—Ointment of iodine.

Take of iodine one scruple, prepared lard one ounce. Rub them together into an ointment.

Vinum cinchoninæ.—Wine of cinchonia.

Take of cinchonia fourteen grains, Madeira wine thirty-one fluid ounces. Dose f. ʒij. to f. ℥ij.

Vinum quininæ.—Wine of quinia.

Take of sulphate of quinia nine grains, Madeira wine two pounds. Dose from f. ʒiv. to f. ℥iv.

APPENDIX I.

An account of the constituent parts of some of the most popular among Patent and other Medicines, extracted from Dr. Paris's Pharmacologia.

Anderson's pills are formed principally of aloes, with a portion of jalap and oil of aniseed.

Anodyne necklaces.—The roots of henbane are commonly strung in the form of beads, and sold under this name, to be tied round the necks of children to facilitate the growth of their teeth, and allay the irritation of teething.

Antivenereal drops, so famous at Amsterdam, were analysed by Scheele, who found that they were composed of muriate of iron, with a small portion of corrosive sublimate.

Aromatic vinegar (Henry's) is merely a solution of camphor and some essential oil. A preparation of this kind may be extemporaneously made by putting one drachm of acetate of potassa into a phial, with a few drops of some fragrant oil, and ♏xx. of concentrated sulphuric acid.

Balsam of honey, or *pectoral balsam*, is the tincture of benzoin, or that of Tolu.

Balsam of liquorice. (Pectoral). The proprietor of this nostrum gravely affirms, that f. ℥iß. contains the virtues of a whole pound of liquorice root; but, upon investigation, it will be found to consist principally of paregoric elixir, very strongly impregnated with the oil of aniseed.

Barclay's antibilious pills. Take of the extract of colocynth two drachms, resin of jalap one drachm, almond soap a drachm and a half, guaiacum three drachms, tartarised antimony eight grains, essential oils of juniper, carraway, and rosemary, of each four drops, of syrup of buckthorn, as much as will be sufficient to form a mass to be divided into sixty-four pills.

Bateman's pectoral drops consist principally of the tincture of castor, with portions of camphor and opium, flavored by aniseed and colored by cochineal.

Battley's sedative liquor (liquor opii sedativus). Under this name Mr. Battley, of Fore-street, London, has introduced a narcotic preparation, which it is generally supposed owes its efficacy to the acetate of morphia; on being kept, however, I found that it underwent some important change, during which so much air was disengaged as to blow out the cork from the bottle with violence. This is a great objection to its admission into practice. [We think it, however, right to state that this preparation has been used by us and very many of our friends with decided advantage over the common tincture of opium.—Ed.]

Black drop, or the *Lancaster or Quaker's black drop.* This preparation, which has long been known and esteemed as being more powerful in its operation, and less distressing in its effects, than any tincture of opium, has until lately been involved in much obscurity; the papers, however, of the late Edward Walton, of Sunderland, one of the near relations of the original proprietor, having fallen into the hands of Dr. Armstrong, that gentleman has obliged the profession by publishing the manner in which it is prepared, and is as follows:—'Take half a pound of opium sliced, three pints of good verjuice (juice of the wild crab), and one and a half ounce of nutmegs, and half an ounce of saffron. Boil them to a proper thickness; then add a quarter of a pound of sugar, and two spoonsful of yeast. Set the whole in a warm place near the fire for six or eight weeks; then place it in the open air until it become a syrup. Lastly, decant, filter, and bottle it up, adding a little sugar to each bottle. One drop of this preparation is considered about equal to three of the tincture of opium.—Ph. L. It would appear that an acetate of morphia is formed, which is more active and less distressing in its effects than any other narcotic combination.

The French Codex contains directions for preparing a compound very similar to the black drop, viz. *Vinum opiatum fermentatione paratum*, or *Guttæ, seu laudanum abbatis Rousseau.* Take of white honey twelve ounces, warm water three pounds. Dissolve the honey in the water, pour it into a matrass and set it aside in a warm place; as soon as fermentation has commenced, add four ounces of good opium, having previously dissolved, or rather diffused it in twelve ounces of water. Allow them to ferment together for a month; then evaporate until ten ounces only re-

main. Filter, and add four ounces and a half of alcohol.

Broaum's nervous cordial consists of the tinctures of gentium, calumba, cardamom, and bark, with the compound spirit of lavender and wine of iron.

Ching's worm lozenges.—These consist of yellow and brown lozenges; the former are taken in the evening, the latter the succeeding morning.

The yellow lozenges. Saffron half an ounce, water a pint, boil and strain; add of white panacea of mercury (calomel washed in spirit of wine) a pound, white sugar twenty-eight pounds, mucilage of tragacanth as much as may be sufficient to make a mass, which roll out of an exact thickness, so that each lozenge may contain one grain of panacea. Dose from one to six.

The brown lozenges. Panacea seven ounces, resin of jalap three pounds and a half, white sugar nine pounds, mucilage of tragacanth enough for each lozenge to contain half a grain of panacea.

Cough drops.—Under this word, Dr. Paris says, Opium is the quack's sheet anchor. The various nostrums advertised as cough drops for the cure of colds, asthmas, catarrhs, &c., are preparations of opium very similar to paregoric elixir. Pectoral balsam of liquorice, and essence of coltsfoot, are combinations of this kind. Grindle's cough drops are a preparation of this kind, made with rectified spirit instead of proof spirit, and consequently more highly charged with stimulant materials. 'The mischief,' observes Dr. Fothergill, 'that has proceeded from the healing anodynes of quacks can scarcely be imagined; for in coughs arising from suppressed perspiration, or an inflammatory diathesis, opiates generally do harm.'

Court plaster. Sticking plaster.—Black silk is strained and brushed over ten or twelve times with the following preparation: Dissolve half an ounce of gum benzoin in six fluid ounces of rectified spirit; in a separate vessel dissolve an ounce of isinglass in half a pint of water; strain each solution; mix them; and let them rest, so that the grosser parts may subside. When the clear liquor is cold it will form a jelly, which must be warmed before it is applied. When dry, in order to prevent its cracking, it is finished off with a solution of four ounces of Chio turpentine in six ounces of tincture of benzoin.

Crespigny (Lady) her pills, or lady Webster's pills. These popular pills are the pilulæ stomachicæ, vulgò pilulæ ante cibum of the Codex Medicamentarius Parisiensis. Editio quinta, A. D. 1758: viz. Take of best aloes six drachms, mastich and red rose of each two drachms, syrup of wormwood as much as will be sufficient to make a mass. The mass is divided into pills of three grains each.

Daffy's elixir. This is the tinctura sennæ composita, with the substitution of treacle for sugar candy, and the addition of aniseeds. Different kinds of this nostrum are sold under the names of Dicey's; but they differ principally in some subordinate minutiæ or unimportant additions.

Dalby's carminative. This consists of carbonate of magnesia two scruples, oil of peppermint one drop, of nutmeg two drops, of aniseed three drops, of the tinctures of castor thirty drops, of assafœtida fifteen drops, spirit of pennyroyal fifteen drops, of the compound tincture of cardamoms thirty drops, peppermint water two fluid ounces.

Dinner pills. See *Lady Crespigny's pills.*

Dixon's antibilious pills. Aloes, scammony, rhubarb, and tartarised antimony.

Dutch drops. The basis of this nostrum consists of the residue of a redistillation of oil of turpentine, which is a thick, red, resinous matter, to which the name of balsam of turpentine has been given: a preparation however is frequently vended as 'Dutch Drops', which is a mixture of oil of turpentine, tincture of guaiacum, spirit of nitric ether, with small portions of the oil of amber and cloves.

Eau medicinale. After various attempts to discover the active ingredients of this Parisian remedy, it is at length determined to be the colchicum autumnale, which several ancient authors, under the name of hermodactyls, have recommended in the cure of gout. The following is the receipt for preparing this medicine:—Take two ounces of the root of colchicum cut into slices, macerate it in four fluid ounces of proof spirit, and filter.

Essence of coffee. The pulp of cassia is said to form the basis of this article.

Essence of coltsfoot. This preparation consists of equal parts of the balsam of tolu and the compound tincture of benzoin, to which is added double the quantity of rectified spirit of wine.

Essence of mustard. (Whitehead.) This consists of oil of turpentine, camphor, and a portion of spirit of rosemary; to which is added a small quantity of flour of mustard.

Essence of mustard pills. Balsam of tolu with resin!

Essence of spruce. A fluid extract by decoction from the twigs of the species of fir called the pinus larix, producing the Venice turpentine, is the well known essence of spruce, which, when fermented with molasses, forms the popular beverage called spruce beer.

Essential salt of lemons. The preparation sold under this name for the purpose of removing iron moulds from linen consists of cream of tartar and superoxalate of potassa, or salt of sorrel, in equal proportions.

Friar's balsam is nothing more than the compound tincture of benzoin of the pharmacopœias.

Godfrey's cordial. The following receipt for this nostrum was obtained from a wholesale druggist, who makes and sells many hundred dozen bottles in the course of the year. There are, however, several other formulæ for its preparation, but not essentially different. Infuse nine ounces of sassafras, and of the seeds of carraway, coriander, and anise, of each one ounce, in six pints of water; simmer the mixture until it is reduced to four pints; then add six pounds of treacle, and boil the whole for a few minutes; when it is cold add three fluid ounces of the tincture of opium.

Golden ointment. Under this name is sold a preparation which consists of sulphuret of arsenic [orpiment] with lard or spermaceti ointment.

The unguentum hydrargyri nitrico-oxydi of the London college is also sold under the same title.

Gout tincture (Wilson's). *This is merely an infusion of colchicum, as Dr. Williams of Ipswich has satisfactorily shown.*

Gowland's lotion is a solution of sublimate in an emulsion formed of bitter almonds in the proportion of about a grain and a half to a fluid ounce.

Hooper's pills. Compound aloetic pill with myrrh (pil. rufi), sulphate of iron, and Canella bark.

James's powder. See the present article under the word *Pulvis antimonialis.*

James's analeptic pills. These consist of James's powder, gum ammoniacum, and the pill of aloes with myrrh (pil. rufi), equal parts, with a sufficient quantity of the tincture of castor to make a mass.

Norton's drops. A disguised solution of corrosive sublimate.

Opodeldoc (Steers's). Castile soap one ounce, rectified spirit eight ounces, camphor three ounces and a half, oil of rosemary half a fluid drachm, oil of origanum one fluid drachm, solution of ammonia six fluid drachms.

Oxley's concentrated essence of Jamaica ginger. A mere solution of ginger in rectified spirit.

Portland powder. Equal quantities of the roots of gentian and birthwort, the tops and leaves of germander, ground pine, and lesser centaury powdered and mixed together.

Riga balsam. From the shoots of the pinus cembra previously bruised, and macerated for a month in water. This same fir also affords Briançon turpentine.

Roche's embrocation. Olive oil mixed with about half its quantity of the oil of cloves and amber.

Ruspini's tincture. This consists of the root of the florentine iris eight ounces, cloves one ounce, rectified spirit two pints, ambergris one scruple.

Seidlitz powders. These consist of two different powders; the one contained in a white paper consists of two drachms of tartarised soda and two scruples of carbonate of soda; that in the blue paper of thirty-five grains of tartaric acid. The contents of the white paper are to be dissolved in half a pint of spring water, to which those of the blue paper are to be added; the draught is to be taken in a state of effervescence. The acid, being in excess, renders it more grateful and no less efficacious as a purgative.

Singleton's ointment. See *Golden ointment.*

Sodaic powders. Contained in two distinct 's, one of which is blue, the other white; in the former consists of half a drachm of the carbonate of soda; that in the latter of twenty-five grains of tartaric acid. These powders require half a pint of water. It is very evident that a solution of these powders is by no means similar to soda water, which it is intended to emulate; for in this latter preparation the soda is in combination only with carbonic acid, whereas th solution of the sodaic powders is that of a [illegible]tral salt with a portion of fixed air diffused through it.

Spilsbury's antiscorbutic drops.—Of corrosive sublimate two drachms, prepared sulphuret of antimony one drachm, gentian root and orange peel equal parts two drachms, shavings of red sanders one drachm, made into a tincture with a pint of proof spirit. Digest and strain.

Stephen's (Mrs.), remedy for the stone consisted of lime in conjunction with an alkali.

Velno's vegetable syrup.—There is a great obscurity with respect to the genuine composition of this nostrum: it is supposed to consist of sublimate rubbed up with honey and mucilage. I have reason, however, to believe that it contains antimony, and the syrup of marsh mallows. Swediaur says that the volatile alkali enters into it as an ingredient: this alkali was proposed by Dr. Peyrile as a substitute for mercury, and it constitutes the active ingredient of a composition, proposed by Mr. Besnard, physician to the king of Bavaria.

Virgin's milk. A spirituous solution of benzoin, mixed with about twenty parts of rose water, forms a cosmetic long known by this name. A sulphate of lead is also sold under this name, which is prepared as follows:—To a saturated solution of alum add of Goulard's extract one third part. Shake them together.

Ward's paste for fistulas, piles, &c. Take of black pepper and elecampane, powdered, equal parts, half a pound; of the seeds of fennel a pound and a half; of honey and sugar equal parts, one pound; beat and well mix together all the ingredients in a mortar. Dose the size of a nutmeg three times a day.

Worm cakes (*Storey's*).—Calomel and jalap made into cakes and colored by cinnabar.

APPENDIX II.

TABLE.—Showing the proportions in which OPIUM, ANTIMONY, ARSENIC, and MERCURY, are contained in some compound medicines. From THOMSON'S DISPENSATORY.

OPIUM.

Confectio opii. London.—Confection of opium. Thirty-six grains contain one grain of opium.

Electuarium opiatum. Edinburgh.—Opiate electuary contains in each drachm about one grain and a half of opium.

Pilulæ saponis cum opio. London.—Pills of soap and opium. Five grains contain one grain of opium.

Pilulæ opiatæ. Edinburgh.—Opiate (formerly Thebaic) pills. Each drachm contains six grains of opium. A pill of five grains contains half a grain of opium.

Pulvis cornu usti cum opio. London.—Powder of burnt hartshorn with opium. Ten grains contain one grain of opium.

Pulvis cretæ compositus cum opio. London.—Compound powder of chalk with opium. Two scruples contain one grain of opium.

Pulvis ipecacuanhæ compositus. London.—Compound powder of ipecacuanha. Ten grains contain one grain of opium.

Pulvis kino compositus. London—Compound powder of kino. Each scruple contains one grain of opium.

Tinctura opii. London.—Tincture of opium. Nineteen minims contain one grain of opium.

Tinctura opii. Edinburgh.—Tincture of opium is made with two scruples of opium in each ounce of liquid, or each drachm should contain five grains. But one drachm of the tincture when evaporated yields only three grains and a half of opium.

Tinctura camphoræ composita. London.—Compound tincture of camphor. *Tinctura opii camphorata.* Edinburgh.—Half a fluid ounce contains nearly one grain of opium.

Tinctura opii ammoniata. Edinburgh.—Ammoniated tincture of opium is made with about eight grains of opium in each ounce of liquid, or each drachm should contain nearly one grain of opium.

Tinctura saponis et opii. Edinburgh.—Tincture of soap and opium is made with one scruple of opium in each ounce of the liquid.

Trochisci glycyrrhizæ cum opio. Edinburgh.—Troches of liquorice with opium. Each drachm contains nearly one grain of opium.

Antimony.

Vinum antimonii tartarizati. London.—Solution of tartarised antimony, contains in each fluid ounce two grains of tartarised antimony.

Vinum tartritis antimonii. Edinburgh.—Wine of tartrate of antimony contains in each ounce two grains of tartrate of antimony.

Mercury.

Emplastrum hydrargyri. Edinburgh.—Mercurial plaster. Each drachm contains about sixteen grains of mercury (fifteen London).

Hydrargyrum cum cretâ. London.—Mercury with chalk. Three grains contain one grain of mercury.

Liquor hydrargyri oxymuriatis. London.—Solution of oxymuriate of mercury. Two fluid ounces contain half a grain of oxymuriate of mercury.

Linimentum hydrargyri. London.—Mercurial ointment. Six drachms contain one drachm of mercury.

Pilulæ hydrargyri. London.—Mercurial pills. Three grains contain one grain of mercury.

Pilulæ hydrargyri. Edinburgh.—Mercurial pills. Each drachm contains fifteen grains of mercury. Each five grain pill contains one and one-fourth grain of mercury.

Pilulæ hydrargyri submuriatis compositæ. London. Edinburgh.—Pills of submuriate of mercury. About four grains contain one grain of submuriate of mercury.

Unguentum hydrargyri fortius. London.—Stronger mercurial ointment. Two drachms contain one drachm of mercury.

Unguentum hydrargyri mitius. London.—Weaker mercurial ointment. Six drachms contain one drachm of mercury.

Unguentum hydrargyri. Edinburgh.—Mercurial ointment. Each drachm contains twelve grains of mercury: made with double the quantity of mercury, each drachm contains twenty grains.

Unguentum nitratis hydrargyri fortius. Edinburgh.—Stronger ointment of nitrate of mercury. Each drachm contains four grains of mercury.

Unguentum nitratis hydrargyi mitius. Edinburgh.—Milder ointment of nitrate of mercury. Each scruple contains half a grain of mercury.

Unguentum oxidi hydrargyri cinerei. Edinburgh.—Ointment of the gray oxide of mercury. Each drachm contains fifteen grains of the oxide.

Unguentum oxidi hydrargyri rubri. Edinburgh.—Ointment of red oxide of mercury. Each drachm contains seven grains of the oxide.

Arsenic.

Liquor arsenicalis. London.—*Solutio arsenicalis.* Edinburgh.—Arsenical solution. One fluid ounce contains four grains of white sublimed arsenic.

APPENDIX III.

Weights and Measures.

(Extracted from Mr. Gray's Supplement to the Pharmacopœia, a most useful work, and from which we had contemplated much extract; but our limits being already trespassed upon, and not being able to do justice to our original design in reference to this work without very considerable enlargement of the article, we must content ourselves with recommending the possession of this book to such of our readers as are curious to learn, not only the drugs and compounds which are used by practitioners of medicine, but also 'most of those which are used in the chemical arts, or which undergo chemical preparation,' &c. Many of these have of course, and will further fall under notice in the prosecution of our own labors; but we think Mr. Gray has been most meritoriously employed in collecting a mass of information into one volume, of which we repeat our recommendation).

Medicines, except a few hereafter mentioned, were formerly sold, and the prescriptions of physicians made up, by the common English weight, called avoirdupois. The ounce of that weight being then, as appears by all the old authors on arithmetic, subdivided into eight drachms, twenty-four scruples, and 480 English grains; the medical pound differing from the common by its containing only twelve ounces, while the troy ounce had for its fractions pennyweights and troy grains. The College of Physicians having at length, in the 1720 edition of the Pharmacopœia, ordered the drachms, scruples, and grains to be adjusted to the troy ounce, hence, as the dispensers of medicines were the only persons who used these small weights, those adjusted to the avoirdupois ounce went out of use, and were no longer made, and the quarter-ounce was the smallest avoirdupois weight in common use, as it still continues; but as the Italian rotolo for raw silk has been adjusted to the avoirdupois weight, and made twenty-four ounces a pound; a smaller weight, the Spanish adarme, equal to the sixteenth part of the avoirdupois ounce, was used under the name of a dram, for weighing silk, and this has now become an established fraction of this ounce, but it is scarcely used by any other persons than haberdashers, and, for all weights less than the quarter of an ounce troy, apothecaries' weights are employed, although as the avoirdupois pound is established by statute at 7000 troy grains, the quarter ounce containing 109 grs. 375, and the drachm 27, gr. 34375, are most inconvenient numbers for reduction.

Table of Avoirdupois Weight.

Commercial Fractions.		Troy Grains.	Decimal Fractions.
1 pound		7000·	1·0000
15 ounces		6562·50	0·9375
14 —		6125·00	0·8750
13 —		5687·50	0·8125
12 —	or ¾ po'	5250·00	0·7500
11 —		4812·50	0·6875
10 —		4375·00	0·6250
9 —		3937·50	0·5625
8 —	or ½ po'	3500·00	0·5000
7 —		3062·50	0·4375
6 —		2625·00	0·3750
5 —		2187·50	0·3125
4 —	or ¼ po	1750·00	0·2500
3 —		1312·50	0·1875
2 —		875·00	0·1250
1 —		437·50	0·0625=1·0000
15 drachms		410·16	0·0586=0·9375
14 —		382·81	0·0547=0·8750
13 —		355·47	0·0508=0·8125
12 —	or ¾ oz.	328·13	0·0469=0·7500
11 —		300·78	0·0430=0·6875
10 —		273·44	0·0391=0·6250
9 —		246·09	0·0352=0·5625
8 —	or ½ oz	218·75	0·0313=0·5000
7 —		191·41	0·0273=0·4375
6 —		164·06	0·0234=0·3750
5 —		136·72	0·0195=0·3125
4 —	or ¼ oz.	109·35	0·0156=0·2500
3 —		82·03	0·0117=0·1875
2 —		54·69	0·0078=0·1250
1 —		27·34	0·0039=0·0625
½ —		13·67	0·0019=0·0313

Apothecaries' Weight.

A few choice articles of the Materia Medica, as lapis bezoar, seed pearl, white amber, balm of Mecca, oil of cinnamon, and some electuaries, high in popular estimation, and imported from Italy, as Venice treacle and orvietan, were always weighed by the troy ounce, and its subdivisions into pennyweights and grains, and still pay duties at the custom-house by that weight, as may be seen in the book of rates. But it was not until the directions given in the London Pharmacopœia, edition of 1720, that the troy ounce was divided into the same fractions of drachms, scruples, and grains, as the avoirdupois, for the purpose of dispensing all such drugs as were ordered by weight. This alteration must have been and is still productive of very great confusion, by obliging the same person to have two sets of weights,—one for buying and selling, the other for preparing the officinal preparations and compounds, and for making up prescriptions. It does not clearly appear why this alteration was made in respect only to drugs ordered by weight, by which their proportion in the officinal preparations and compositions was increased one-tenth; as the avoirdupois ounce, with its old divisions into eight drachms, and drops, sixty of which were presumed equal to the drachm, was, and is still retained, in respect to drugs that are dispensed by measure.

Table of Apothecaries' Weight.

Usual Fractions.		Troy Grains.	Decimal Fractions.
1 pound		5760	1·0000
11 ounces		5280	0·9167
10 —		4800	0·8333
9 —	or ¾ lb.	4320	0·7500
8 —		3840	0·6667
7 —		3360	0·5833
6 —	or ½ lb.	2880	0·5000
5 —		2400	0·4167
4 —		1920	0·3333
3 —	or ¼ lb.	1440	0·2500
2 —		960	0·1667
1 —		480	0·0833=1·0000
7 drachms		420	0·0729=0·8750
6 —		360	0·0625=0·7500
5 —		300	0·0521=0·6250
4 —	or ½ ounce	240	0·0417=0·5000

Usual Fractions.	Troy Grains.	Decimal Fractions.
3 ——	180	0·0315=0·3750
2 ——	120	0·0208=0·2500
1 ——	60	0·0104=0·1250
2 scruples	40	0·0070=0·0833
½ dram	30	0·0052=0·0625
1 scruple	20	0·0035=0·0416
½ scruple	10	0·0017=0·0212
	5	0·0008=0·0106
	3	0·0005=0·0062
	2	0·0003=0·0041
	1	0·0002=0·0021

As apothecaries or chemists seldom keep troy weight beyond four or eight ounces, the relation between the apothecary or troy pounds and ounces and the common weight is often required in preparing the officinal preparations, and is here given; the quarter ounce being used instead of the avoirdupois drachm, as the latter weight is seldom or never kept by chemists or dispensers.

Troy or Apothecary Pounds.		Avoirdupois. lb.	oz.	qr.	grains.
100	=	82	4	2	31·250
50	=	41	2	1	15·625
30	=	24	10	3	96·875
20	=	16	7	1	28·125
10	=	8	3	2	68·749
5	=	4	1	3	34·375
3	=	2	7	1	108·125
2	=	1	10	1	35·625
1	=		13	0	72·500

Apothecary Weight.		Avoirdupois. oz.	qr.	grains.
℥ix	=	9	3	54·375
℥vj, or lbß	=	6	2	36·250
℥iij	=	3	1	18.125
℥ij	=	2	0	85·000
℥j	=	1	0	42·500
ʒiv, or ℥ß	=		2	21·250
ʒij	=		1	10·625

Although the quarter ounce is only 109 grains ·375, it will be convenient in adding two or more of these reductions together to take the even 110 grains as its value.

The Scotch pound trone is equal to 9600 grains Scotch troy weight, or 9527 grains English ·25: the Scotch Dutch troy pound is equal to 7680 Scotch grains, or 7620 grains English ·8: both pounds are divided into sixteen ounces, the ounce Dutch equal to 476 grains English ·3.

Besides the regular weights, articles are sometimes quoted by the weight of seeds or kernels, as the weight of a nutmeg, or of so many black pepper corns. In India they use the paddy weight, or that of the grains of rough rice, each of which is equal to about 2-5ths of a grain; the gulivindum weight, or that of a jumble bead, equal to about one grain $\frac{5}{16}$; the retti weight, equal to about two grains $\frac{3}{16}$. Gold coins are sometimes used, as the gold fanam weight equal to eight grains; the star pagoda weight equal to about eighty-four grains.

Measures.

In the old editions of the London Pharmacopœia the liquids were compounded by avoirdupois weight; and the following terms were used for expressing a determinate number of ounces.

The Cyathus, or cup	for	1 oz½
Hemina, or cotyle	—	9 oz
Libra, or pint	—	12 oz
Sextarius, or ⅙ of a congius	—	18 oz
Congius, or gallon	—	108 oz

In 1720, when the Pharmacopœia was improved by Sir Hans Sloane and Dr. Quincy, the liquids were ordered by measure, and the gallon adopted by the London College was that just enacted for wine and spirituous liquors, containing 231 cubic inches, divided into eight pints; they divided the pint, which holds sixteen avoirdupois ounces, ten drachms, seventeen grains of water, into sixteen ounces, and these into eight drachms. Smaller quantities were ordered by drops, supposed to be equal to grains; but now the dram measure is divided into sixty minims, and graduated tubes used to measure them, so that the old divisions of the avoirdupois ounce were, and are still retained in respect to liquids.

Aëriform fluids are measured by cubic inches.

The relation between wine measure, with the college divisions, and cubic inches, is thus expressed.

Wine and Medical Measure.	Cubic inches. 1000th parts.
10 gallons	2310·000
5 ——	1155·000
3 ——	693·000
2 ——	462·000
1 ——	231·000
½ gallon, or four pints	115·500
2 pints	57·750
1 pint	28·875
¾ pint, or twelve ounces medical measure	21·645
½ pint, or eight ounces	14·437
¼ pint, or four ounces	7·218
2 ounces	3·609
1 ounce	1·804
6 drachms	1·353
4 ——	0·902
2 drachms	0·451
1 drachm	0·225
½ drachm, or thirty minims	0·112
20 minims	0·056
10 ——	0·037
5 ——	0·018
3 ——	0·011
2 ——	0·007
1 ——	0·003
Scotch gill	[illegible]6·462
—— mutchken	[illegible]85
—— choppen	[illegible]1·7
—— pint	103·4
—— quart	206·8
—— gallon	827·28

The Scotch pint is equal to forty-one ounces trone of Tay water, or fifty-five ounces troy of Leith water; specific gravity of Tay water 100, of Leith water 103.

Ale and beer measure is seldom mentioned by medical or chemical writers; the gallon contains 282 cubic inches; thirty-two gallons are a London barrel of ale, thirty-four a country barrel of either ale or beer, and thirty-six a London barrel of beer. Nor is dry measure often used; the Winchester bushel, of eight gallons, measures 2150 cubic inches ·4, or one cubic foot ·822, and the quarter eight bushels.

The imperial gallon, lately added to the others in use, is established by the weight of distilled water it will hold at 62° Fahrenheit, the barometer standing at thirty inches.

The gallon is to hold ten avoirdupois pounds of water, and must consequently measure 277 cubic inches ·274.

The pint is to hold twenty avoirdupois ounces, and should of course measure thirty-four cubic inches ·659.

The avoirdupois ounce measure of water is therefore one cubic inch ·73298.

The troy ounce of water measures one cubic inch ·9013214.

The weight of a cubic inch of water is 252 grains ·456; and that of a cubic foot is sixty-two avoirdupois pounds ·3206.

A cubic foot of air, or 1728 cubic inches, weighs 528 troy grains ·367, or one avoirdupois ounce, three drachms, eight grains ·23.

Besides these measures, other irregular measures of uncertain content, are used:—

A table spoonful, cochlearium magnum, of syrup ℥ß.
of distilled waters ʒiijß to ℥ß.
of spirits and tinctures ʒij to ʒiij.

A dessert spoonful, cochlearium mediocre, of water ʒij.

A tea or coffee spoonful, cochlearium parvum, of syrup ʒj to ʒij.
of distilled waters ℈jß to ℈ij.
of spirit and tinctures ℈j to ℈jß.
of a light powder, as magnesia, ℈ß to ℈j.
of a heavy powder, as sulphur, ℈jß to ℈ij.
of a metallic oxide ʒj to ℈iiij.

A thimbleful, clypeola metallica pro digitis, is usually the same as a tea spoonful.

A tea-cup, vasculum pro theâ, ℥iij to ℥iv.

A wine glass, scyphus pro vino, cyathus, ℥jß.

APPENDIX IV.

A List of ABBREVIATIONS taken from the PUPIL'S PHARMACOPŒIA by MR. MAUGHAM. An exceedingly useful publication for medical students whose knowledge of Latin is not extensive.

A. or *āā.*—*ανα, ana,* signifies *of each.* It is placed after two or more substances, thus:—

℞. Tincturæ lavandulæ,
——— cinnamoni, āā ʒij.

i. e. take of tincture of lavender, ana of tincture of cinnamon, of each two drachms.

Abdom.—Abdōmen, *the belly.*

Abs. febr.—Absente febre, *the fever being absent.*

Ad 2 vic.—Ad duas vices, *at two takings.*

Ad gr. acid.—Ad gratam aciditātem, *to an agreeable acidity.*

Ad libit.—Ad libĭtum, *at pleasure.*

Add.—Adde, *add;* addantur, *let them be added;* addendus, *to be added.*

Admov.—Admoveātur, *let it be applied;* admoveantur, *let them be applied.*

Adst. febre—Adstante febre, *the fever being present.*

Aggred. febre—Aggrediente febre, *the fever coming on.*

Altern. horis—Alternis horis, *at every other hour.*

Alvo adst.—Alvo adstricto, *the belly or bowels being bound.*

Aq. bull.—Aqua bulliens, *boiling water.*

Aq. ferv.—Aqua fervens, *boiling water.*

Bis ind.—Bis indies, *twice daily.*

BB. Bbds.—Barbadensis, *Barbadoes.*

Bull.—Bulliat, *let it boil;* bulliant, *let them boil.*

Cærul.—Cærulĕus, *blue.*

Cap. or *Capt.*—Capiat, *let him take,* [*i. e.* let the patient take.]

C. m.—Cras manè, *to-morrow morning.*

Coch. ampl.—Cochleāre amplum, *a large spoonful.*

Coch. infant.—Cochleāre infantis, *a child's spoonful.*

Coch. magn.—Cochleāre magnum, *a large spoonful.*

Coch. mod.—Cochleāre modicum, *a middling-sized spoonful,* i. e. *a dessert spoonful.*

Coch. parv.—Cochleāre parvum, *a little spoonful,* or *tea-spoonful.*

Col.—Colātus, *strained.*

Colat.—Colātur, *let it be strained.*

Colat.—Colaturæ, *of* or *to the strained* [liquor.]

Colent.—Colentur, *let them be strained.*

Comp.—Composĭtus, *compound.*

Cont. rem.—Continuentur remedia, *let the medicines be continued.*

Coq.—Coque, *boil;* or, coquantur, *let them* [i. e. *the ingredients*] *be boiled.*

Crast.—Crastĭnus, *of to-morrow.*

Cuj.—Cujus, *of which.*

Cujusl.—Cujuslibet, *of any.*

Cyath. theæ—Cyătho theæ, *in a cup of tea.*

Deb. spiss.—Debĭta spissitūdo, *a proper consistence.*

Decub.—Decubĭtus, *lying down.*

De d. in d.—De die in diem, *from day to day.*

Dej. alvi—Dejectiones alvi, *throwings down of the bowels,—stools.*

Det.—Detur, *let it be given;* dentur, *let them be given.*

Dieb. alt.—Diebus alternis, *every other day.*

Dieb. tert.—Diebus tertiis, *every third day*

Dim.—Dimidius, *one half.*

Dir. prop.—Directiōne propriâ, *with a proper direction.*

Donec alv. bis dej.—Donec alvus bis dejiciātur, *until the bowels are twice moved.*

Donec alv. sol. fuer.—Donec alvus solūta fuĕrit, *until the bowels shall have become relaxed.*

Ejusd.— Ejusdem, *of the same.*

Enem.—Enĕma, *a clyster;* plural, enemăta, *clysters.* It is derived from the Greek ενιημι, *to inject,* and is of the neuter gender.

Ext. sup. alut.—Extende super alūtam, *spread upon leather.*

F. pil. xij.—Fac pilŭlas duodĕcim, *make twelve pills*

Feb. dur.—Febre durante, *during the fever.*

Fem. intern.—Femorĭbus internis, *to the inner part of the thighs.*

Ft. embrocat.—Fiat embrocatio, *let an embrocation be made.*

Ft. gargar.—Fiat gargarismus, *let a gargle be made.*

Ft. haust.—Fiat haustus, *let a draught be made.*

Ft. mist.—Fiat mistūra, *let a mixture be made.*

Ft. pil. xij.—Fiant pilŭlæ duodĕcim, *let twelve pills be made.*

Ft. pulv.—Fiat pulvis, *let a powder be made.*
Ft. or *F. venæs.*—Fiat venæsectio, *let bleeding be performed.*
Fist. arm.—Fistŭla armata, *a prepared pipe,* i. e. *a clyster-pipe and bladder prepared for use.*
Fl.—Fluĭdus, *liquid.*
Gel. quav.—Gelatinâ quâvis, *in any sort of jelly.*
G. G. G.—Gummi guttæ Gambĭæ, *Gamboge drops.*
Gr.—Granum, *a grain;* or grana, *grains.*
Gtt.—Gutta, *a drop;* or guttæ, *drops.*
Gutt. quibusd.—Guttis quibusdam, *with a few drops.*
Har. pil. sum. iij.—Harum pilulārum sumantur tres, *let three of these pills be taken.*
Hor. decub.—Horâ decubĭtus, *at the hour of lying down,* i. e. *at going to bed.*
Hor. som.—Horâ somni, *at the hour of sleep,* i. e. *at bed-time.*
Hor. un. spatio—Horæ unĭus spatĭo, *at the expiration of an hour.*
Hor. interm.—Horĭs intermedĭis, *at intermediate hours.*
Ind.—Indies, *daily.*
In pulm.—In pulmento, *in gruel.*
Inj. enem.—Injiciātur enĕma, *let a clyster be given.*
Lat. dol.—Latĕri dolenti, *to the affected side.*
M.—Misce, *mix;* also mensurâ, *by measure;* and manipŭlus, *a handful.*
Manè pr.—Manè primo, *early in the morning.*
Min.—Minĭmum, *the sixtieth part of a fluid drachm.*
Mitt.—Mitte, *send;* mittatur *let it be sent;* mittantur, *let them be sent.*
Mitt. sang. ad ℥xvj. saltem.—Mittātur sanguis ad uncĭas sedĕcim saltem, *let blood be taken away to sixteen ounces at least.*
Mod. præsc.—Modo præscripto, *in the manner prescribed.*
Mor. sol.—More solĭto, *in the usual manner.*
N.—Numero, *in number.*
N. M.—Nux moschata, *a nutmeg.*
O.—Octarius, *a wine pint.*
Ol. lini s. i.—Olĕum lini sine igne, *linseed oil without fire,* [i. e. *cold drawn.*]
Omn. bid.—Omni biduo, *every two days.*
Omn. bih.—Omni bihorio, *every two hours.*
Omn. hor.—Omni horâ, *every hour.*
Omn. man.—Omni mane, *every morning.*
Omn. noct.—Omni nocte, *every night.*
Omn. quadr. hor.—Omni quadrante horæ, *every quarter of an hour.*
Oz.—*The ounce avoirdupois weight.*
P.—*Pondo by weight.*
P. Æ.—Partes æquāles, *equal parts.*
P. D.—Pharmacopœia Dublinensis, *pharmacopœia of Dublin.*
P. E.—Pharmacopœia Edinensis, *pharmacopœia of Edinburgh.*
P. L.—Pharmacopœia Londinensis, *pharmacopœia of London.*
Part, vic.—Partĭtis vicĭbus, *in divided doses.*
Per. op. emet.—Peracta operatĭone emetĭci, *the operation of the emetic being finished.*
Post sing. sed. liq.—Post singulas sedes liquidas, *after each liquid or loose stool.*
P. r. n.—Pro re natâ, *occasionally* [i. e. *according to circumstances.*]
P. rat. ætat—Pro ratĭone ætātis, *according to the state of age* [i. e. *according to the age of a person.*]
P. or *Pug.*—Pugillus. This word in Pliny signifies *a handful,* but it is intended to denote *a gripe between the finger and thumb.*
Q. P.—Quantum placet, *as much as you please.*
Q. s.—Quantum sufficiat, *as much as may be sufficient.*
Qqe. hor.—Quâque horâ, *at every hour.*
Quor—Quorum, *of which.*
℞.—Recipe, *take.*
Red. in pulv.—Redactus in pulvĕrem, *reduced to powder.*
Redig. in pulv.—Redigātur in pulvĕrem, *let it be reduced to powder*
Reg. umbil.—Regio umbilĭci, *the region of the navel* [i. e. *the parts about the navel.*]
Repet.—Repetātur, *let it be continued;* or repetantur, *let them be continued.*
S. A.—Secundum artem, *according to art.*
Semidr.—Semidrachma, *half a drachm.*
Semih.—Semihōra, *half an hour.*
Sesunc.—Sesuncĭa, *an ounce and a half.*
Sesquih.—Sesquihōra, *an hour and a half.*
Si n. val.—Si non valeat, *if it should not answer.*
Si op. sit—Si opus sit, *if there should be occasion.*
Si vir. perm.—Si vires permittant, *if the strength permit.*
Sign. n. pr.—Signetur nomĭne proprĭo, *let it be marked with the proper name;* as, *Tincture of lavender,* instead of *Tinctura lavandulæ,* &c.
Ss.—Semi, *half.*
St.—Stet, *let it stand;* or stent, *let them stand.*
Sub fin. coct.—Sub finem coctiōnis, *towards the end of boiling* [i. e. *when boiling is just finished.*]
Sum. tal.—Sumat talem, *let him* [i. e. *the patient*] *take such as this.*
S. V.—Spirĭtus vinōsus, *ardenttspirit.*
S. V. R.—Spirĭtus vinōsus rectĭficātus, *rectified spirit of wine.*
S. V. T.—Spirĭtus vinōsus tenuis, *weak spirit of wine* [i. e. *proof spirit; half spirit of wine, and half water.*]
Temp. dext.—Tempori dextro, *to the right temple.*
Temp. sinist.—Tempori sinistro, *to the left temple.*
T. O.—Tinctūra opii, *tincture of opium.*
T. O. C.—Tinctūra opii camphorāta, *camphorated tincture of opium—paregoric.*
Ult. præsc.—Ultimo præscriptus, the *last prescribed.*
V. O. S.—Vitello ovi solutus, *dissolved in the yolk of an egg.*
Vom. urg.—Vomitiōne urgente, *the vomiting taking place* [i. e. *when the vomiting begins.*]
Zz.—Zinziber, *ginger.*

INDEX.

As the articles in the Pharmacopœia, like those in the Materia Medica, are all arranged alphabetically, it would be a useless repetition to add an alphabetic index; we merely, therefore, present a list of the order in which the subjects are treated.

PHARMACUSA, an island in the Ægean Sea, where Julius Cæsar was seized by pirates.

PHARMUTHI, in the ancient Egyptian chronology, one of the months of their year, answering to April in the Roman kalendar.

PHARNABAZUS, the son of Pharnabazus, a satrap of Persia, and a general under Artaxerxes Longimanus. See PERSIA. He betrayed the celebrated Alcibiades to his enemies. He flourished about A. A. C. 409.

PHARNACE, a town of Pontus.

PHARNACES, the favorite son of Mithridates the Great, king of Pontus, who ungratefully rebelled against him, and caused him to kill himself. He was defeated by Cæsar, in the expeditious battle of which he wrote home to Rome, Veni, Vidi, Vici. Pharnaces was afterwards killed in another battle with the Romans. See PONTUS.

PHARNACEUM, in botany, a genus of the trigynia order, belonging to the pentandria class of plants; and in the natural method ranking under the twenty-second order, caryophylleæ.

PHARNAPATES, a general of the Parthians, under Orodes, who was killed in battle by the Romans.

PHARNUS, a king of Media, who was conquered by Ninus king of Assyria.

PHA'ROS, *n. s.* } From Pharos in Egypt.
PHARE. } A light-house; a lantern on the shore to direct ships.

He augmented and repaired the port of Ostia, built a *pharos* or light-house. *Arbuthnot on Coins.*

PHAROS is a pile or erection raised near a port, where fire is kept burning in the night, to direct vessels near at hand. The Pharos of Alexandria, built in the island of Pharos at the mouth of the Nile, was anciently very famous, insomuch as to communicate its name to all the rest. This most magnificent tower consisted of several stories and galleries, with a lantern at top, in which a light being continually burning, might be seen 100 miles off. It was accounted one of the seven wonders of the world. It was built by the architect Sostrates, a native of Cnidos, or, according to some, Deiphanes, the father of Soctrates; and cost Ptolemy Philadelphus 800 talents. The several stories were adorned with columns, balustrades, and galleries of the finest marble and workmanship; to which some add, that the architect had contrived to fasten some looking-glasses so artificially against the highest galleries that one could see in them all the ships that sailed on the sea for a great way. Instead of this noble structure, there is now only an irregular castle, without ditches or outworks of any strength, out of which rises a tower, which serves for a light-house, but has nothing of the beauty and grandeur of the old one. The Colossus of Rhodes also served as a pharos.

PHAROS, in ancient geography, a small oblong island adjoining the continent of Egypt, over against Alexandria. On account of the port of Alexandria, the entrance to which was difficult and dangerous, the Pharos was called the key of Egypt, or of the Egyptian sea (Lucan); and Pharos, from being a proper name, is become an appellative to denote all light-houses from the magnificent building of that description on the island. It stood upon four crabs of glass.

PHAROS, an island on the coast of Illyricum, now Lesina.

PHARPAR, or PHARPHAR, one of the rivers of Damascus, or rather an arm of the Barrady or Chrysorrhoas, which waters Damascus and the country about it. 2 Kings v. 12. The river of Damascus has its fountain in the mountains of Lebanus. At its approach to the city it is divided into three arms, one of which passes through Damascus. The other two water the gardens round about, and then, reuniting, they lose themselves at four or five leagues from the

city, towards the north. See Maundrell's Travels from Aleppo to Jerusalem; also the articles ABANA and DAMASCUS.

PHARSALIA, an epic poem, composed by Lucan on the civil war between Pompey and Cæsar, and particularly on the victory of the latter over the former. It is a poem universally acknowledged to have both great beauties and great defects; but we are the less capable of estimating its merit as a whole, that either time has deprived us of the last books, or its author has left it incomplete.

PHARSALIA or PHARSALIUM, PHARSALOS or PHARSALUS, a town of Phthiotis, a district of Thessaly, near Pheræ and Larissa, now Farsa, to which last place Pompey fled from the plains of Pharsalus. It is watered by the Enipeus, which falls into the Apidanus, and both into the Peneus. Between Pharsalus and Enipeus Pompey drew up his men at the fatal battle of Pharsalia. At the commencement of this battle the whole plain was covered, from Pharsalia to the Enipeus, with two armies, dressed and armed after the same manner, and bearing the same ensigns. At first both kept a mournful silence; but at length the trumpets sounded, and Cæsar's army advanced to begin the attack, when Caius Crastinus, a centurion, at the head of 120 men, threw himself upon the enemy's first line with incredible fury, and made a great slaughter of them. But while he was still pressing forward, forcing his way through the first line, one of Pompey's men ran at him with such violence that the point of his sword, piercing him in the mouth, came out at the hind part of his neck. Pompey's soldiers then took courage, and stood the enemy's onset. While the foot were thus sharply engaged in the centre, Pompey's horse in the left wing marched up, and, having widened their ranks with a design to surround Cæsar's right wing, charged his cavalry, and forced them to give ground. Hereupon Cæsar ordered his horse to retreat a little, and give way to the six cohorts, which he had posted in the rear as a body of reserve. These, upon a signal, coming up, charged the enemy's horse with determined resolution, aiming only at the faces of the enemy. This new manner of fighting had the desired effect. For the young patricians, whom Cæsar called the young dancers, not willing to have their faces deformed with scars, turned their backs, and fled in the utmost confusion, leaving the foot at the mercy of the enemy. Cæsar's men did not pursue them; but, charging the foot, now naked and unguarded, surrounded them, and cut most of them to pieces. Pompey was so transported with rage at seeing the flower of his forces thus cut in pieces, that he left his army, and retired slowly to his tent, without speaking a word, and continued there, like one distracted, till his whole army was defeated. Cæsar no sooner saw himself master of the field than he marched to attack Pompey in his entrenchments; upon which the latter stole out at the decuman gate, and took the road to Larissa, which city had hitherto shown great attachment to him, but where he was now murdered; though some say this happened at Pelusium. (See POMPEY.) In the mean time Cæsar began the attack on the enemy's camp, which was vigorously defended by the cohorts Pompey had left to guard it; but they were at length forced to yield. Cæsar was not a little surprised when, after having forced the entrenchments, he found the enemy had made preparations beforehand for a festival after the victory, which they thought certain. In Pompey's tent Cæsar found the box in which he kept his letters; but, with a magnanimity worthy of himself, he burnt them all, without reading one; saying that he had rather be ignorant of crimes than obliged to punish them. The next day, when the dead were numbered, it appeared that Cæsar had scarcely lost 200 men; among whom were about thirty centurions, whom he caused to be buried with great solemnity. He paid particular honors to the body of Crastinus, and ordered his ashes to be deposited in a tomb. On Pompey's side the number of the dead amounted to 15,000 according to some, and to 25,000 according to others. Cæsar took 24,000 prisoners, eight eagles, and 180 ensigns.

PHARSALUS, or PHARSALIA, an extensive plain of Thessaly, between the above town and the Enipeus, in which the decisive battle abovementioned was fought.

PHARUS, in botany, a genus of the hexandria order, belonging to the monœcia class of plants; and in the natural method ranking under the fourth order, gramina. The male calyx is a bivalved uniflorous glume; the corolla a bivalved glume; the female calyx the same with the male; the corolla a uniflorous, long, and wrapping glume. There is but one seed.

PHARUSII, or PHAURUSII; an ancient nation of Africa, beyond Mauritania.

PHARYBUS, a river of Macedonia, which runs into the Ægean Sea; by some called Baphyrus.

PHARYCADON, an ancient town of Macedonia, on the Peneus.

PHARYGE, an ancient town of Locris.

PHARYNGOTOMY, *n. s.* Gr. φαρυγξ and τεμνω, to cut. An incision into the pharynx or wind pipe, made when some tumor in the throat hinders respiration.

PHARNYX. See ANATOMY, Index.

PHARZA, or FARSA, a town of European Turkey in Janna, the ancient Thessaly, anciently called Pharsalia, fourteen miles south of Larissa. See FARSA and PHARSALIA.

PHASCUM, in botany, a genus of the order of musci, belonging to the cryptogamia class of plants. The anthera is operculated, with a ciliated mouth; the calyptræ are minute.

PHASE, or PHASIS. See PHASIS.

PHASELIS, an ancient town of Pamphylia, much frequented by pirates.

PHASELS. Lat. phaseoli. French beans.—Ainsworth. See PHASEOLUS.

PHASEOLUS, the kidney-bean; a genus of the decandria order, belonging to the diadelphia class of plants, and in the natural method ranking under the thirty-second order, papilionaceæ. Linnæus enumerates fifteen species. Of these, one comprehends many varieties. Those principally cultivated for the table are, 1. The common white, or Dutch kidney-bean; 2. The

smaller kidney-bean, called the Battersea kidney-bean; and, 3. The upright sort, called the tree kidney-bean. 1. The first sort was some time ago propagated in England, and is still in Holland; it grows very tall, and requires long stakes and poles to climb on, and its beans are considerably broad; this makes them less saleable in the markets, people supposing them to be old because they are broad; and they are hence grown into disuse, though a much more valuable kind for eating than any other. 2. The Battersea bean is what is more universally cultivated: it never grows very tall, nor rambles far, and the air can easily pass between the rows, because of its moderate growth; this makes it bear plentifully, and ripen well for the table. It is the best tasted bean; except the last. 3. The tree kidney-bean is also a plentiful bearer, and never rambles, but grows up in form of a shrub; but its beans are broader than the Battersea kind, and are not so well tasted. They are all propagated from seeds, which are to be put into the ground in the end of March or beginning of April for an early crop; but they should have a warm situation and a dry soil; and be planted in a dry season. The manner of planting them is to draw lines with a bough over the bed, at three feet and a half distance, into which the seeds are to be dropped about two inches asunder; and the earth is to be drawn over them with the head of a rake, to cover them about an inch deep. In a week after sowing the plants will appear, and the earth should be drawn up about their stalks as they rise up; for a few days after this they will require no farther care except to be kept clear from weeds, and, when the beans appear, to have them gathered twice a-week; for, if the beans are suffered to hang on too long, they not only become of no value, but they weaken the plant. The first crop of kidney-beans will continue a month in good order; and, to supply the table afterwards, there should be fresh sowings in March, April, May, and June; the last of which will continue till the frosts come to destroy them. Some raise their early crops on hot beds; and this is to be done exactly in the same manner as the raising the early cucumbers.

Phaseolus, a species of phaseolus, apparently a very useful one, has been discovered by M. Moraney, 'an inhabitant of Morne-Rouge, dependent on the Cape;' we suppose Cape François of the island of St. Domingo. It requires no peculiar management: its roots are in season when the pods blacken, and its fibres run in every direction, searching for nourishment through the clefts of rocks, and receiving the impression of the strata without injury. If the principal root is left, the plant shoots again and flourishes as before; but it is not yet ascertained whether it puts forth any new roots. The seeds are not alimentary when dressed, as if nature designed them only for propagating other plants. Every use which a farinaceous plant can supply this new phaseolus has successfully answered.

PHASIANIA, in ancient geography, a country of Asia, seated on the banks of the Phasis.

PHASIANI, the people of Phasiana. They were originally from Egypt.

PHASIANUS, in ornithology, a genus of birds belonging to the order of gallinæ. The cheeks are covered with a smooth naked skin. Gibbon, in his Roman History, tells us that the name phasianus is derived from the river Phasis, the banks of which are the native habitation of the pheasant. There are many species and varieties.

1. P. argus is yellowish, with black spots, a red face, and a blue crest on the back of the head. It is found in Chinese Tartary. 'The Argus,' says Latham, 'though it be a native in China, is very commonly found in the woods of Sumatra, where it is called coo-ow. It is found extremely difficult to be kept alive for any considerable time after catching it in the woods; never for more than a month. It seems to have an antipathy to the light, being quite inanimate in the open day; but, when kept in a dark place, it appears perfectly at ease, and sometimes makes its note or call, from which it takes its name; and which is rather plaintive, and not harsh like that of a peacock. The flesh resembles that of the common pheasant.'

2. P. colchicus, red, with a blue head, a wedge-shaped tail, and papillous cheeks. It is a native of Africa and Asia.

3. P. gallus, the common dunghill cock and hen, with a compressed caruncle or fleshy comb on the top of the head, and a couple of caruncles or wattles under the chin. The ears are naked, and the tail is compressed and erected. Of all birds perhaps this species affords the greatest number of varieties; there being scarcely two to be found that exactly resemble each other in plumage and form. The tail, which makes such a beautiful figure in most of these birds, is entirely wanting in others; and in some even the rump also. The toes, which are usually four in all animals of the poultry kind, yet in one species amount to five. The feathers, which lie so sleek and in such beautiful order in most of those we are acquainted with, are in a peculiar species all inverted, and stand staring the wrong way. Nay, there is a variety that comes from Japan, which, instead of feathers, seems to be covered over with hair. It is not well ascertained when the cock was first made domestic in Europe; but it is generally agreed that he was first brought to Europe from Persia. Aristophanes calls the cock the Persian bird; and tells us he enjoyed that kingdom before some of its earliest monarchs. This animal was known so early even in the most savage parts of Europe that the cock was one of the forbidden foods among the ancient Britons. Indeed the domestic fowl seems to have banished the wild one. Persia itself seems no longer to know it in its natural form. But the cock is still found in the islands of Tinian, in many others of the Indian Ocean, and in the woods on the coast of Malabar, in its ancient state of independence. In his wild condition his plumage is black and yellow, and his comb and wattles yellow and purple. There is another peculiarity also in those of the Indian woods; their bones, which, when boiled, with us are white, in those are as black as ebony. No animal has greater courage than the cock when opposed to, one of his own species; and in every part of the world

where refinement and polished manners have not entirely taken place, cock-fighting is a principal diversion. In China, India, the Philippine Islands, and all over the east, cock-fighting is the sport and amusement even of kings and princes. With us it is declining every day; and it is to be hoped it will in time be abolished even among the vulgar. The cock claps his wings before he sings or crows. His sight is very piercing; and he never fails to cry in a peculiar manner when he discovers any bird of prey in the air. His extraordinary courage is thought to proceed from his being the most salacious of all birds. A single cock suffices for ten or a dozen hens; and it is said that he is the only animal whose spirits are not abated by indulgence. But he soon grows old; the radical moisture is exhausted; and in three or four years he becomes utterly unfit for impregnation. 'Hens also,' says Willoughby, 'as they for the greatest part of the year daily lay eggs, cannot suffice for so many births, but for the most part after three years become barren.' The hen seldom clutches a brood of chickens above once a season, though instances have been known in which they have produced two. The number of eggs a domestic hen will lay in the year are above 200, provided she be well fed and supplied with water and liberty. It matters not much whether she be trodden by the cock or not; she will continue to lay, although the eggs of this kind can never by hatching be brought to produce a living animal. Her nest is made without any care, if left to herself; a hole scratched in the ground, among a few bushes, is the only preparation she makes for this season of patient expectation. Nature, almost exhausted by its own fecundity, seems to inform her of the proper time for hatching, which she herself testifies by a clucking note, and by discontinuing to lay. The good housewives, who often get more by their hens' eggs than by their chickens, often artificially protract this clucking season, and sometimes entirely remove it. As soon as a hen begins to cluck, they stint her in her provisions; when, if that fails, they plunge her into cold water; this, for the time, effectually puts back her hatching; but then it often kills the poor bird, who takes cold and dies under the operation. If left entirely to herself, the hen would seldom lay above twenty eggs in the same nest, without attempting to hatch them. In the wild state the hen seldom lays above fifteen eggs. When the hen has hatched her chickens, her affection seems to alter her very nature, and correct her imperfections. No longer voracious or cowardly, she abstains from all food that her young can swallow, and flies boldly at every creature that she thinks is likely to do them mischief. Capons may very easily be taught to clutch chickens. To effect this they pluck the feathers off his breast, and rub the bare skin with nettles; they then put the chickens to him, which presently run under his breast and belly, and probably rubbing his bare skin gently with their heads, allay the stinging pain which the nettles had just produced. This is repeated for two or three nights, till the animal takes an affection to the chickens that have thus given him relief, and continues to give them the protection they seek for. He from that time brings up a brood of chickens like a hen, clutching them, feeding them, clucking and performing all the functions of the tenderest parent. A capon once accustomed to this service will not give over; but when one brood is grown up, he may have another nearly hatched put under him, which he will treat with the same tenderness he did the former. The cock, from his salaciousness, is a short lived animal in a domestic state; but how long these birds live, if left to themselves, is not yet well ascertained. Aldrovandus hints their age to be ten years; and it is probable that this may be its extent. They are subject to some disorders; and as for poisons, besides nux vomica, which is fatal to most animals except man, they are injured, as Linnæus asserts, by elderberries, of which they are not a little fond. Of this species Mr. Latham enumerates no less than thirteen varieties, beginning with the wild cock, which is a third less in the body than the domestic cock. This variety he imagines to be the original stock whence all our domestic varieties have sprung. They appear to be natives of the forests of India. There are but few places, however, as he observes, where the different voyagers have not met with cocks and hens either wild or tame. Those of Pulo Condore are very much like our own, but considerably less, being only of the size of a crow. Damp. Voy. vol. I. p. 392. Those of Sumatra and Java are remarkably large, and are called the St. Jago breed. The cock is so tall as to peck off a common dining-table. When fatigued, he sits down on the first joint of the leg. Hist. Sumatra, p. 98. They are found in New Guinea, but not in great plenty. For. Voy. p. 105. Forster observes that they are numerous at Easter, Society, and Friendly Isles; at the two last they are of a prodigious size. They are not uncommon at the Marquesas, Hebrides, and New Caledonia; but the Low Isles are quite destitute of them. See Obs. p. 193. Ducks and poultry are numerous in the Sandwich Isles. Cook's Journal, p. 229. They are not found to breed in the northern parts of Siberia, and in Greenland are only kept as rarities. Faun. Groen.

4. P. Guineensis, the motmot, or Guinea pheasant, is brownish, somewhat red below, with a wedge-like tail, and wants spurs.

5. P. nocthemerus is white, with a black crest and belly, and a wedge-shaped tail. It is a native of China.

6. P. pictus has a yellowish crest, a red breast, and a wedge-shaped tail. It is a native of China.

PHA'SIS, *n. s.* In the plural phases. Fr. *phase*; Gr. φασις. Appearance; particular appearance of a heavenly body, as the moon, &c.

All the hypotheses yet contrived, were built upon too narrow an inspection of the *phases* of the universe. *Glanville.*

He o'er the seas shall love, or fame pursue;
And other months, another *phasis* view;
Fixt to the rudder, he shall boldly steer,
And pass those rocks which Tiphys used to fear.
Creech.

Such alas!
Are the illusions of this Proteus life;

All, all is false: through every *phasis* still
'Tis shadowy and deceitful. *Kirk White.*

PHASIS, in ancient geography, a river which falls into the Euxine, about 700 miles from Constantinople. 'From the Iberian Caucasus,' says Gibbon, 'the most lofty and craggy mountains of Asia, that river descends with such oblique vehemence that in a short space it is traversed by 120 bridges. Nor does the stream become placid and navigable till it reaches the town of Sarapana, five days' journey from the Cyrus, which flows from the same hills, but in a contrary direction, to the Caspian Lake. The proximity of these rivers has suggested the practice, or at least the idea, of wafting the precious merchandise of India down the Oxus, over the Caspian, up the Cyrus, and with the current of the Phasis into the Euxine and Mediterranean Sea. As it successively collects the streams of the plain of Colchos, the Phasis moves with diminished speed, though accumulated weight. At the mouth it is sixty fathoms deep, and half a league broad; but a small woody island is interposed in the midst of the channel: the water, so soon as it has deposited an earthy or metallic sediment, floats on the surface of the waves, and is no longer susceptible of corruption. In a course of 100 miles, forty of which are navigable for large vessels, the Phasis divides the celebrated region of Colchos, or Mingrelia, which, on three sides, is fortified by the Iberian and Armenian mountains, and whose maritime coast extends about 200 miles, from the neighbourhood of Trebizond to Dioicurias, and the confines of Circassia. Both the soil and climate are relaxed by excessive moisture; twenty-eight rivers, besides the Phasis and his dependent streams, convey their waters to the sea; and the hollowness of the ground appears to indicate the subterraneous channels between the Euxine and the Caspian.'

PHASIS, an ancient city of Colchis, so named from the above river.

PHASM, *n. s.* Gr. φασμα. Appearance; phantom; fancied apparition.

Thence proceed many aereal fictions and *phasms* and chymæras created by the vanity of our own hearts or seductions of evil spirits, and not planted in them by God. *Hammond.*

PHASMATA, PHASMS, in physiology, are certain appearances arising from the various tinctures of the clouds by the rays of the heavenly bodies, especially the sun and moon. These are infinitely diversified by the different figures and situations of the clouds, and the appulses of the rays of light; and, together with the occasional flashings and shootings of different meteors, they have, no doubt, occasioned those prodigies of armies fighting in the air, &c., of which we have such frequent accounts in most ancient authors. See 2 Maccab. xi. 8; Melancth. Meteor; 2 Shel. de Comet. ann. 1618; Josephus.

PHASSACHATES, in lithology, a species of agate, which the ancients, in its various appearances, sometimes called leucachates and perileucos.

PHAUSINGES, in medicine, Gr. φαύσιγγες, red circles in the leg, produced by the heat of the fire.

PHAVORINUS, an ancient lexic[illegible], author of a Greek Lexicon, still extant; the best edition of which is that in fol. Venet. 1712. Lempriere. Perhaps he is the same with Favorinus, a native of Arles in Gaul. See FAVORINUS.

PHAYLLUS, tyrant of Ambracia, brother of the celebrated Onomarchus of Phocis. See PHOCIS. *Paus.* x. c. 2.

PHEA, or PHEIA, an ancient town of Elis. *Homer's Iliad*, vii.

PHEAS'ANT, *n. s.* Fr. *faisan;* Lat. *phasianus*, from Phasis a river of Colchis. A kind of wild cock.

The hardest to draw are tame birds; as the cock, peacock, and *pheasant.* *Peacham on Drawing.*

Preach as I please, I doubt our curious men
Will chuse a *pheasant* still before a hen. *Pope.*

Not so the *pheasant* on his charms presumes,
Though he too has a glory in his plumes.
He, christian-like, retreats with modest mien
To the close copse, or far sequestered green,
And shines without desiring to be seen. *Cowper.*

PHEASANT, in ornithology. See PHASIANUS. Mr. Latham enumerates nine different species of pheasant, and six varieties of the common; but as he gives them no distinctive, trivial, or classical names, we reserved a description of several of them to this article.

1. PHEASANT, COMMON. Latham observes that the common pheasant is now found in a state of nature in almost the whole of the old continent. They sometimes, he says, come into farm-yards near woods, and produce cross breeds with common hens. 'M. Salerne,' he adds, 'remarks that the hen pheasant, when done laying and sitting, will get the plumage of the male, and after that become so little respected by him, as to be treated with the same incivility as he would show to one of his own sex. Pheasants were originally brought into Europe from the banks of the Phasis, a river of Colchis, in Asia Minor; and from whence they still retain their name. Next to the peacock, they are the most beautiful of birds, as well for the vivid color of their plumes as for their happy mixtures and variety. These birds, so beautiful to the eye, are not less delicate when served up to the table. Their flesh is considered as the greatest dainty. A spirit of independence seems to attend the pheasant even in captivity. In the woods, the hen pheasant lays from eighteen to twenty eggs in a season; but, in a domestic state, she seldom lays above ten. In the same manner, when wild, she hatches and leads up her brood with patience, vigilance, and courage; but when kept tame, she never sits well, so that a hen is generally her substitute upon such occasions: and, as for leading her young to their food, she is utterly ignorant of where it is to be found; and the young birds starve, if left solely to her protection. The pheasant, therefore, on every account, seems better left at large in the woods than reclaimed to pristine captivity. Its fecundity when wild is sufficient to stock the forest; its beautiful plumage adorns it; and its flesh retains a higher flavor from its unlimited freedom. At night they roost upon the highest trees of the wood; and by day they come down into the lower brakes and bushes, where their food is chiefly found. They

generally make a kind of flapping noise when they are with the females; and this often apprises the sportsman of their retreats. At other times he traces them in the snow, and frequently takes them in springs. But of all birds they are shot most easily; as they always make a whirring noise when they rise, by which they alarm the gunner, and being a large mark, and flying very slow, there is little chance of missing them. When these birds are taken young into keeping, they become as familiar as chickens. For her nest dry grass and leaves must be laid for her in the pheasantry. The young ones are very difficult to be reared, and they must be supplied with ants' eggs, which is the food the old one leads them to gather when wild in the woods. To make these go the farther, they are to be chopped up with curds or other meat: and the young ones are to be fed with great exactness, both as to the quantity and the time of their supply. This food is sometimes also to be varied; and wood-lice, earwigs, and other insects, are to make a variety. The place where they are reared must be kept extremely clean; their water must be changed twice or thrice a day; they must not be exposed till the dew is off the ground in the morning, and they should always be taken in before sunset. When they become adult, they can very well shift for themselves; but they are particularly fond of oats and barley. The pheasant, when full grown, seems to feed indifferently upon every thing that offers. A French writer asserts that they regale even upon carrion.

2. Pheasant, Courier. The courier pheasant is but very imperfectly described by Fernandez; and is said to be eighteen inches long. The general color of the plumage is white, inclined to fulvous; about the tail they are black, mixed with some spots of white; the tail itself is long, and of a green color, reflecting in some lights like the feathers of a peacock: the wings are short. This species inhabits the hotter parts of Mexico; flies slow; but is recorded to outrun the swiftest horse.

3. Pheasant,. Hybridal, a name given by Latham to a species or variety which is a mixed breed between the pheasant and cock; one of which was in the Leverian Museum.

4. Pheasant, Parraka. The parraka is about the size of a small fowl, resembling it in the bill, legs, and body. Its length is twenty-three inches. The color of the bill is dark rufous; the eyes are brown; the general color of the plumage is a deep brown on the back, and fulvous under the belly: the top of the head is fulvous, and the feathers are somewhat long, but not so much as to form a real crest; the wings are short; the webs of some of the quills are somewhat rufous; the tail consists of twelve feathers, is even at the end, about a foot in length, and is, for the most part, carried pendent; the legs are of a dark rufous, inclining to black; the claws are like those of a fowl. It is peculiar (says Mr. Latham) in its internal structure in respect to the windpipe; which, instead of entering directly the breast, as in most birds, passes over the side of the left clavicle, and on the outside of the fleshy part of the breast, being covered only by the skin; then, taking a turn upwards, passes over the right clavicle into the breast, and is distributed through the lungs in the usual way. The female has not this circumvolution of the windpipe. The hannequaw, mentioned by Bancroft, is probably the same bird. He says that it is black, roosts in trees, and may be heard early in the morning, distinctly but hoarsely, repeating the word hannequaw (easily mistaken for parraquaw) very loud. These are found in the unfrequented woods of the internal parts of Cayenne, Guiana, and many parts of South America. At sun-rise they set up a very loud cry, which is thought to be the loudest of all birds in the New World; at which time the eyes appear red, as does a small skin under the breast, which is not at all seen, except when the bird makes such exertions, or is angry. This cry is very like the word parraquaw; and is repeated many times together; and often many cry at once, or answer one another, but most in breeding time, which is twice in the year; at each time laying from four to six eggs; making the nest in low branches or stumps of trees, and behaving with their chickens in the same manner as hens. They feed on grain, seeds, and herbs; but feed the young in the nest with worms and small insects. These, with many other birds, inhabit the woods by day, coming out into the open savannas morning and evening to feed; at which times they are chiefly killed by the natives and near inhabitants. They may be brought up tame; and their flesh is much esteemed.

5. Pheasant, Superb. This bird Linnæus describes from the various representations of it painted on paper hangings, and China-ware; and farther confirmed by a figure and description in a Chinese book which came under his inspection.

In stocking a pheasantry, says Mr. Loudon, the general mode is to procure eggs from some establishment of this sort or otherwise. The following are the directions of Castang, as given in Mowbray's Treatise on Poultry:—Eggs being provided, put them under a hen that has kept the nest three or four days; and, if you set two or three hens on the same day, you will have the advantage of shifting the good eggs. At the end of ten or twelve days throw away those that are bad, and set the same hen or hens again, if sitting hens should not be plenty. The hens having sat their full time, such of the young pheasants as are already hatched put into a basket, with a piece of flannel, till the hen has done hatching. The brood now come, put under a frame with a net over it, and a place for the hen, that she cannot get to the young pheasants, but that they may go to her: and feed them with boiled egg cut small, boiled milk and bread, alum curd, ants' eggs, a little of each sort and often. After two or three days they will be acquainted with the call of the hen that hatched them, may have their liberty to run on the grass plat, or elsewhere, observing to shift them with the sun, and out of the cold winds; they need not have their liberty in the morning till the sun is up; and they must be shut in with the hen in good time in the evening. Every thing now going on properly, you must be very careful (in

order to guard against the distemper to which they are liable) in your choice of a situation for breeding the birds up; and be less afraid of foxes, dogs, polecats, and all sorts of vermin, than the distemper. Castang had rather encounter all the former than the latter; for those with care may be prevented, but the distemper once got in is like the plague, and destroys all your hopes. What he means by a good situation is nothing more than a place where no poultry, pheasants, or turkeys, &c., have ever been kept; such as the warm side of a field, orchard, pleasure-ground, or garden, or even on a common, or a good green lane, under circumstances of this kind; or by a wood side; but then it is proper for a man to keep with them, under a temporary hovel, and to have two or three dogs chained at a proper distance, with a lamp or two at night. He has known a great number of pheasants bred up in this manner in the most exposed situations. It is proper for the man always to have a gun, that he may keep off the hawks, owls, jays, magpies, &c. The dogs and lamps shy the foxes more than any thing; and the dogs will give tongue for the man to be on his guard if smaller vermin are near, or when strollers make their appearance. The birds going on as before mentioned, should so continue till September, or (if very early bred) the middle of August. Before they begin to shift the long feathers in the tail, they are to be shut up in the basket with the hen regularly every night; and when they begin to shift their tail the birds are large, and begin to lie out, that is, they are not willing to come to be shut up in the basket: those that are intended to be turned out wild, should be taught to perch (a situation they have never been used to); this is done by tying a string to the hen's leg, and obliging her to sit in a tree all night: be sure you put her in the tree before sun-set; and, if she falls down, you must persevere in putting her up again till she is contented with her situation; then the young birds will follow the hen, and perch with her. This being done, and the country now covered with corn, fruits, and shrubs, &c., they will shift for themselves. For such young pheasants as you make choice of for your breeding-stock at home, and likewise to turn out in the spring following, provide a new piece of ground, large and roomy for two pens, where no pheasants, &c., have been kept, and there put your young birds in as they begin to shift their tails. Such of them as you intend to turn out at a future time, or in another place, put into one pen netted over, and leave their wings as they are; and those you wish to keep for breeding put into the other pen, cutting one wing of each bird. The gold and silver pheasants you must pen earlier, or they will be off. Cut the wing often; and when first penned feed all your young birds with barley-meal, dough, corn, and plenty of green turnips.

Strict cleanliness is to be observed in *feeding* pheasants: the meat must not be tainted with dung, and the water to be pure and often renewed. Ants' eggs being scarce, hog-lice, earwigs, or any insect may be given; or artificial ants' eggs substituted, composed of flour beaten up with an egg and shell together, the [illegible] rubbed between the fingers to the proper size. After the first three weeks, in a scarcity of ants' eggs, Castang gives a few gentles, procured from a good liver tied up, the gentles, when ready, dropping into a pan or box of bran; to be given sparingly, and not considered as common food. Food for grown pheasants, barley or wheat; generally the same as for other poultry. In a cold spring hemp seed, or other warming seeds, are comfortable, and will forward the breeding-stock.

Pheasant-pouts. Young pheasants; for the driving and taking of which within nets, when you have found out an eye of them, place your nets cross the little paths and ways they have made, which are much like sheep tracks; and, if possible, you should find out one of their principal haunts, which may be easily known by the barrenness of the ground, their mutings, and the feathers which lie scattered about; and always take the wind with you, for it is their custom to run down the wind; place the nets hollow, loose, and circular-wise; the nether-part must be fastened to the ground, and the upper side lie hollow, so that when any thing rushes in, it may fall and entangle it. Having so fixed the net, go to the haunts, and if you find the eye scattered, with your call draw them together, and when you find them begin to cluck and pipe to one another, then forbear calling, and take an instrument, by some called a driver; which is made of strong white wands, or osiers, such as basket-makers use, which must be set in a handle: in two or three places it must be twisted or bound about with small osiers, according to the figure. With this driver, as soon as you see the pheasants gathered together, make a great noise on the boughs and bushes about you, which will so frighten them that they will all get close together, and run away a little distance, and stand to hearken; then make the same noise a second time, which will make them run again, and continue the same till you have driven them into your nets, for they may be driven like sheep; but, if it happens that they take a contrary way, then make a croaking noise, as it were, in their faces, which will presently turn them the right way, as you would have them; but, in using the driver, first observe secrecy, in keeping yourself out of their sight; for if they espy you they will run and hide themselves in holes, under shrubs, and will not stir till night. Secondly, take time and leisure, for rashness and over-haste spoil the sport.

Pheasant-shooting. This is now the only method (as hawking is disused) by which pheasants are taken by the fair sportsman. See the article Shooting.

Pheasant's Eye, in botany. See Adonis.

Pheasants, Isle of, or Isle de Faisans, or the Isle of Conference, an island between France and Spain, formed by the Bidassoa, abounding with pheasants. The Bidassoa had long been a subject of dispute between France and Spain, each country laying claim to it exclusivel[illegible]til the fifteenth century, when it was agr[illegible]tween Louis XII. of France, and Ferdinand V. of Spain, that the river should be common to both nations. This island was after-

wards the scene where another treaty, called the Treaty of the Pyrenees, was concluded between France and Spain, in 1699; and it was also the scene of an interview between the monarchs of these kingdoms, on the marriage of Louis XIV. whence its latter name. It lies about two miles from Fontarabia.

PHEBE, a deaconess of the port of Corinth, called Cenchrea. St. Paul had a particular esteem for her; and Theodoret thinks he lodged at her house while he continued at Corinth. She brought to Rome the epistle he wrote to the Romans, wherein she is commended in so advantageous a manner. See Rom. xvi. 1, 2.

PHEESE, *v. a.* Perhaps to feaze. To comb; fleece; curry. Obsolete.

> An he be proud with me, I'll *pheese* his pride.
> *Shakspeare.*

PHECADUM, an ancient inland town of Macedonia.

PHEGOR, or PEOR, a deity worshipped at a very early period by the Midianites and Moabites, and probably by all the other tribes which then inhabited Syria. Phegor, or Peor, is the same with the Hebrew word pechor, which signifies aperuit, and probably refers to the poetic influence always attributed to the solar deity, by which he opened or discovered things to come. Accordingly we find Phegor or Peor generally joined to Baal, which was the Syrian and Chaldean name of the sun after he became an object of worship; hence Baal-Phegor must have been the sun worshipped by some particular rites, or under some particular character. See BAAL PEOR.

PHELLANDRIUM, water hemlock; a genus of the digynia order and pentandria class of plants: natural order forty-fifth, umbellatæ. There are two species, one of which, viz.

P. aquaticum, is a native of Britain. This grows in ditches and ponds, but is not very common. The stalk is remarkably thick and dichotomous, and grows in the water. It is a poison to horses, bringing upon them, as Linnæus informs us, a kind of palsy; which, however, he supposes to be owing not so much to the noxious qualities of the plant itself, as to those of an insect which feeds upon it, breeding within the stalks, and which he calls curculio paraplecticus. The Swedes give swines' dung for the cure. The seeds are sometimes given in intermittent fevers, and the leaves are by some added to discutient cataplasms. In the winter the roots and stem, dissected by the influence of the weather, afford a very curious skeleton or network. Horses, sheep, and goats, eat the plant; swine are not fond of it; cows refuse it.

PHELLIA, a river of Laconia.

PHELLOE, an ancient town of Achaia.

PHELLUS, two ancient towns of Greece: one in Attica; and the other in Elis, near Olympia.

PHEMIUS, an ancient musician, who taught Homer music.

PHEMONOE, a priestess of Apollo, who is said to have been the inventress of [illegible] verses.

PHENEATÆ, the people of Ph[illegible]a.

PHENEUM, an ancient town of Arcadia, where Mercury had a temple.

PHENEUS, a town and lake of Arcadia.

PHENGITES, among the ancients, the name of a beautiful species of alabaster. It was a rude irregular mass, very shattery and friable, but of a brightness superior to that of most other marbles, and excelling them all in transparence. The color an agreeable pale yellowish, white, or honey color; the yellow being more intense in some places than others, and sometimes making an obscure resemblance of veins. It is still found, and is very weak and brittle in the mass; when reduced to small pieces, it may be easily crumbled between the fingers into loose, but considerably large, angular pieces, some perfect, others complex, irregular, or mutilated, and all approaching to a flat shape. The ancients were very fond of this species in public buildings; and the temple of Fortune, built entirely of it, has been long celebrated. Nero's golden house was constructed mainly of this marble: and Domitian is said to have had a portico built wholly of it, in which he promenaded enclosed. Its great beauty is its transparence, from which alone the above temple was perfectly light when the doors were shut, though it was built without a window, and had no other light but what was transmitted through the stone its walls were built with. It was anciently found in Cappadocia, and is still plentiful there: we have it also in Germany and France, and in Derbyshire and some other English counties. It takes an excellent polish, and is very fit for ornamental works, where there is no great strength required. See AMETHYST.

PHENICE, a port of the island of Crete, on the west coast of the island. St. Paul having anchored at Phenice, in his voyage to Rome (Acts xxvii. 12), advised the ship's crew to spend the winter there, because the season was too far advanced.

PHENICIA. See PHŒNICIA.

PHENICOP'TER, *n. s.* Gr. φοινικοπτερος; Lat. *phœnicopterus.* A kind of bird described by Martial.

> He blended together the livers of giltheads, the brains of pheasants and peacocks, tongues of *phenicopters*, and the melts of lampreys. *Hakewill.*

PHE'NIX, *n. s.* Gr. φοινιξ; Lat. *phœnix.* A bird supposed to exist single, and to rise again from its own ashes.

> There is one tree, the *phenix* throne; one *phenix*
> At this hour reigning there. *Shakspeare. Tempest.*
>
> To all the fowls he seems a *phenix*. *Milton.*
>
> Having the idea of a *phenix* in my mind, the first enquiry is, whether such a thing does exist. *Locke.*

PHENOM'ENON, *n. s.* French *phenomene;* Gr. φαινομενον, often written phænomenon. It has the original plural termination phænomena: appearance; visible quality: remarkable appearance.

> Short-sighted minds are unfit to make philosophers, whose business it is to describe, in comprehensive theories, the *phenomena* of the world and their causes. *Burnet.*
>
> These are curiosities of little or no moment to the understanding the *phænomena* of nature. *Newton.*
>
> The most considerable *phenomenon*, belonging to

terrestrial bodies, is gravitation, whereby all bodies in the vicinity of the earth press towards its centre. *Bentley's Sermons.*

PHEONS, in heraldry, the barbed heads of darts, arrows, or other weapons, frequently borne in court armours, and termed a Pheon's Head, in Latin Ferrum Jaculi, in French Fer de Dard; as 'He beareth azure, a chevron between three pheons.'

PHEOS, in botany, a name which Theophrastus, Dioscorides, and others, give to a plant used by fullers in dressing their cloths, and of which there were two kinds, a smaller called simply pheos, and a larger called hippopheos. This plant is sometimes called phleos; and is thus confounded with a kind of marsh cudweed, or gnaphalium, called also by that name; but it may always be discovered which of the two plants an author means, by observing the sense in which the word is used, and the use to which the plant was put. The phleos, properly so called, that is, the cudweed, was used to stuff beds and other such things, and to pack up with earthen vessels to prevent their breaking; but the pheos, improperly called phleos, only about cloths: this was, however, also called stæbe and cnaphon.

PHERÆ, an ancient town of Thessaly, where the tyrant Alexander reigned, hence named Pheræus. Strabo 8. Cic. de Off. 2.

PHERÆUS, a surname of Jason and Alexander.

PHERECRATES, a Greek comic poet, who was contemporary with Plato and Aristophanes. After the example of the ancient comedians, who never introduced upon the theatre imaginary but living characters, he acted his contemporaries. But he did not abuse the liberty which at that time prevailed upon the stage. He laid it down as a rule to himself never to hurt the reputation of any person. Twenty-one comedies are attributed to him, of which there now only remain some fragments collected by Hertelius and Grotius. From these, however, it is easy to discern that Pherecrates wrote the purest Greek, and possessed that ingenious and delicate raillery which is called attic urbanity. He was author of a work on Music, and a kind of verse called Pherecratic.

PHERECRATIC VERSE. The last three feet were in hexameter verse, and the first of those three feet was always a spondee. This verse of Horace, for example, Quamvis pontica pinus, is a Pherecratic verse.

PHERECYDES, a native of Scyros, who flourished about A. A. C. 560, and was disciple of Pittacus. See PITTACUS. He is said to have been the first philosopher who wrote on natural subjects and the essence of the gods. He was also the first who held the ridiculous opinion, 'that animals were mere machines.' He was Pythagoras's master, who loved him as his own father: he lived to the age of eighty-five, and was one of the first prose writers among the Greeks. It is difficult to give an accurate account of the doctrines of Pherecydes. It is most probable that he taught those opinions concerning the gods, and the origin of the which the ancient Grecian theogonists borrowed from Egypt. See EGYPT, MYSTERIES, MYTHOLOGY, and POLYTHEISM.

PHERES, in fabulous history, the son of Cretheus and Tyro, who built Pheræ ... saly, where he reigned. He marrie... by whom he had Admetus. Apollo...

PHERETIMA, the wife of Battus, king of Cyrene, and the mother of Arcesilaus. After her son's death she recovered the kingdom by the aid of Amasis king of Egypt, and, to avenge the murder of Arcesilaus, she caused all his assassins to be crucified round the walls of Cyrene, and she cut off the breasts of their wives, and hung them up near the bodies of their husbands. It is said that she was devoured alive by worms; a punishment from heaven for her unparalleled cruelties.

PHERON, a king of Egypt, who succeeded Sesostris. He was blind; and recovered his sight by washing his eyes, according to the directions of the oracle, in the urine of a woman who had never had any unlawful connexions. He tried his wife first, but she appeared to have been faithless to his bed, and was burnt with all those whose virtue would not abide the test prescribed: he married the woman who thus cured him. Herodot. ii. c. 111.

PHETRI. See PARTHIA.

PHI'AL, *n. s.* Gr. φιαλη; Fr. *phiole*; Lat. *phiala*. A small bottle.

> Upon my secure hour thy uncle stole
> With juice of cursed hebenon in a *phial*. *Shakspeare.*

> He proves his explications by experiments made with a *phial* of water, and with globes of glass filled with water. *Newton.*

> Nor less inspire my conduct than my song;
> Teach my best reason reason; my best will
> Teach rectitude; and fix my firm resolve
> Wisdom to wed, and pay her long arrear:
> Nor let the *phial* of thy vengeance, poured
> On this devoted head, be poured in vain. *Young.*

PHIALIA, a town of Arcadia. Paus. viii. 3.

PHICORES, an ancient nation who inhabited the banks of the Palus Mæotis. Mela i. 19.

PHIDIAS, the most famous sculptor of antiquity, was an Athenian, and flourished in the eighty-third Olympiad. This wonderful artist was not only skilled in the use of his tools, but accomplished, we are told, in history, poetry, fable, geometry, optics, &c. He first taught the Greeks to imitate nature perfectly, and all his works were received with admiration. They were also incredibly numerous; for it was almost peculiar to Phidias that he united the greatest facility with the greatest perfection. His Nemesis, one of his first pieces, was carved out of a block of marble, found in the Persian camp, after the battle of Marathon. He made an excellent statue of Minerva for the Plateans; but the statue of this goddess in her magnificent temple at Athens, of which there are still some relics, was an astonishing production. Pericles ordered Phidias to make a statue of the goddess; and Phidias formed a most admirable figure of ivory [illegible]ld, thirty-nine feet high. But what rendere[illegible] name immortal proved at that time his ruin. He had carved upon the shield of the goddess his own portrait and that of Pericles;

and this was made a crime. Upon this he withdrew to Elis, and made for the Elians the Olympic Jupiter; a prodigy of art which was ranked among the seven wonders of the world. It was of ivory and gold; sixty feet high, and every way proportioned. Phidias concluded his labors with this masterpiece; and the Elians, to do honor to his memory, appropriated to his descendants the office of keeping clean this magnificent image. The remains of the statue of the Eleusinian Ceres were purchased by the late Dr. E. D. Clarke and Mr. Cripps of Jesus College, Cambridge, and after being removed at considerable labor and expense, from Greece to England, are now now fixed in the public library of that university.

PHIDIPPIDES, a celebrated courier, who ran from Athens to Lacedæmon, about 152 English miles in two days, to ask of the Lacedæmonians assistance against the Persians. The Athenians raised a temple to his memory.

PHIDITIA, in Grecian antiquity, feasts celebrated with great frugality at Sparta. They were held in the public places and in the open air. Rich and poor assisted at them equally, and on the same footing; their design being to keep up peace, friendship, good understanding, and equality among the citizens great and small. It is said that those who attended this feast brought each a bushel of flour, eight measures of wine named chorus, five mince of cheese, and as many figs.

PHIGALEI, an ancient people of Peloponnesus, who inhabited the country near Messenia. Paus.

PHILA, from φιλειν, to love, in mythology, one of the attributes of Venus, which distinguishes her as the mother of love.

PHILA, an ancient town of Macedonia.

PHILADELPHIA, in antiquity, were games instituted at Sardis to celebrate the union of Caracalla and Geta, the sons of Septimius Severus.

PHILADELPHIA, in ancient geography, the name of four towns; 1. In Arabia. 2. In Cicilia. 3. In Syria. (Lempr.) 4. In Lydia, now called Alah-sher. Plin. v. c. 29.

PHILADELPHIA, an ancient town of Natolia, seated at the foot of mount Tmolus, by the river Cogamus, whence there is a fine view over an extensive plain. It was founded by Attalus Philadelphus, brother of Eumenés, and very liable to earthquakes, which, perhaps, arose from its vicinity to the region called Catakekanmene. So severe were those earthquakes that even the city walls were not secure; and so frequent were they that these experienced daily concussions. The inhabitants, therefore, who were not numerous, lived in perpetual apprehension, and their constant employment was in repairs. In fact, so great were their fears, that their chief residence was in the country, the soil of which was very fertile. Such is Strabo's account of this place. In 1097 it was taken by assault by John Ducas the Greek general. It was without difficulty reduced also in 1106, under the same emperor. The Turks marched from the east with a design to plunder it and the maritime towns. The emperor Manuel in 1175 retired for protection from the Turks to this place. In 1300 it fell by lot to Karaman. In 1306 it was besieged by Alisaras, and considerably harassed; but was not taken. In 1391 this place alone refused to admit Bajazet; but it was at length forced to capitulate for want of provisions. It has been matter of surprise that this town was not totally abandoned; and yet it has survived many cities less liable to inconveniencies, and is still an extensive place, though in appearance it is poor and mean. The materials of the walls appear to have been small stones strongly cemented: they were thick, lofty, and had round towers. Among the mountains near, is a spring of a purgative quality; and many people resort to it in the hot months. The famous wall which credulity has believed to be made of human bones, stands beyond this and the town. Dr. Chandler, who visited it, says, 'the number of churches is twenty-four, mostly in ruins, decorated with painted saints. Only six are in a better condition. The episcopal church is large, and ornamented with gilding, carving, and holy portraits. The Greeks are about 300 families, and live in a friendly intercourse with the Turks. The clergy and laity in general are ignorant of Greek, yet the liturgies and offices of the church are read in that language. The Philadelphians are a civil people. One of the Greeks sent us a small earthen vessel full of choice wine. Philadelphia possessing waters excellent in dyeing, and being situated on one of the most capital roads to Smyrna, is much frequented, especially by Armenian merchants. The Greeks still call this place by its ancient name, but the Turks call it Allahijur. The number of inhabitants is about 8000; of whom 2000 are supposed to be Christians.' It is about forty miles E.S.E. of Smyrna.

PHILADELPHIA, a county of Pennsylvania, bounded north by Bucks County, south-east by Delaware River, south-west by Delaware county, west and north-west by Montgomery county.

PHILADELPHIA, a city and port of entry, Pennsylvania, in a county of the same name, on the west bank of the Delaware; ninety miles south-west of New York, 100 north-east of Baltimore, 321 south-west of Boston, 137 of Washington. Long. 75° 10′ W., lat. 39° 57′ N. Population of the city and liberties, in 1790, 43,525; in 1802 62,000; in 1810 92,247; and in 1817 estimated at 120,000. In 1810 there were, within the city and suburbs, 22,764 buildings, of all kinds, for residence, business, worship, &c.

It is 126 miles from the Atlantic, by the course of the river and bay, and is situated on the narrowest part of an isthmus between the Delaware and the Schuylkill rivers, about six miles above their confluence. The situation is very pleasant and healthy. It was originally laid out by William Penn, in 1683.—The ground plot of the city, distinct from the liberties, is an oblong, about one mile from north to south, and two from east to west. But the buildings now occupy a space upwards of three miles long, from north to south, and they extend from the Delaware to the Schuylkill. There were originally nine streets extending from one river to the other, which were intersected at right angles

by twenty-three running north and south. The number of squares in the original plan was 184, but, as several of these have been intersected by new streets, their number now amounts to 304; and several of these are again intersected by lanes and alleys. Broad Street is 113 feet wide; High or Market Street 100; Mulberry Street sixty; and the other streets, in the original plan, fifty feet wide. The greatest part of the city is well paved with stones in the middle, with neat side walks of brick; furnished with common sewers and gutters, so that the streets are in general kept very clean.

The public buildings are the late state house and offices, two city court houses, a county house, a state penitentiary, a bridewell or jail, a university, the Philosophical Society's hall, the hall for the Academy of Natural Sciences, the Washington Hall, a public library, a hospital, the Friends' alms-house, three dispensaries, an alms-house, two dramatic theatres, a medical theatre, a laboratory, an amphitheatre, a masonic hall, ten incorporated banks, and fifty-nine houses of public worship, nine for General Assembly Presbyterians, two for Associate Reformed Presbyterians, two for Dutch Reformed Presbyterians, two for Reformed Presbyterians, one for Associate Presbyterians, one for German Presbyterians, eleven for Methodists, six for Episcopalians, six for Friends, five for Baptists, four for Roman Catholics, two for German Lutherans, one for English Lutherans, one for Swedes, one for Moravians, one for Universalists, one for Unitarians, one for Dunkers, a New Jerusalem church, and a Jews' Synagogue.

Several of the churches are very spacious and elegant edifices. Each of the Episcopal, the German, and two of the Roman Catholic churches are furnished with organs; and one of the Episcopal churches is ornamented with a steeple. The state house was erected in 1753, and its architecture is much admired. It is now appropriated as a museum, and contains the largest collection of curiosities in America. Adjoining to it is an enclosed square, which is ornamented with rows of trees, and forms a pleasant public walk. The bank of Pennsylvania is a remarkably elegant edifice of marble. The masonic hall is an elegant Gothic edifice, with a handsome steeple. The houses of the city are generally constructed of brick, without much ornament, but have a striking appearance of convenience, comfort, neatness, and opulence. The city contains five different markets, the principal of which is in Market, or High Street, and extends from the Delaware through six squares. The market houses are well supplied with various provisions, which are exposed to sale daily, and most abundantly every Wednesday and Saturday. The United States' bank is in this city; and here is the mint of the United States, in which the national money is coined.

Philadelphia exceeds all other towns in the United States in the variety, extent, and excellence of its manufactures. In 1810 the city and county contained eight cotton manufactories, twenty nail manufactories, eighteen distilleries, seventeen breweries, fifty-nine tanneries, seven paper-mills, fifteen rope walks, three glass works, fourteen marble yards, fifty-four printing and numerous other manufacturing establishments. The total amount of the manufactures of the city and county in 1810 was 16,103,869 dollars. Printing is carried on here more extensively than in any other place in America. This city is celebrated for its excellent porter brewery.

Philadelphia is a place of great opulence, and its trade is extensive and flourishing. Turnpike roads of the best construction diverge from it in various directions. Over the Delaware, Schuylkill, and Susquehanna, in the approaches to the city, there are ten excellent bridges. The Delaware is navigable to this place for a seventy-four gun ship, and for sloops to Trenton. The shipping belonging to this port in 1816 amounted to 101,830 tons.—The environs of the city are pleasant and well cultivated.

The literary and benevolent institutions are numerous, and highly honorable to the inhabitants. The Philadelphia library originated with Dr. Franklin, and was incorporated in 1742. The building belonging to the library company is an elegant edifice, and in its front is a statue of Dr. Franklin, of white marble. It contains a museum, a philosophical apparatus, the Philadelphia library, and the Loganian library, which, together, have about 22,000 volumes. The American Philosophical Society was established here in 1769, and has a library of 4000 volumes. The Philadelphia Society for Promoting Agriculture was instituted in 1785, and has a small library, a cabinet of minerals, and a repository for agricultural implements. The Athenæum of Philadelphia was incorporated in 1815, and has a library of 2000 volumes, a cabinet of minerals and medals, and upon its tables are to be found the principal newspapers published in the United States, and a numerous collection of the American and European Magazines. The Academy of Natural Sciences was founded in 1812, and incorporated in 1817, and has a library of 2000 volumes, and handsome collections on natural history. The library of the Society of Friends contains about 2000 volumes. The oldest seminary of learning in Pennsylvania is that incorporated by William Penn, by the title of Friends Public Schools. This corporation has considerable funds, and supports a number of schools; and under its directions the Latin and Greek Languages, the mathematics, and natural and experimental philosophy, are taught. The astronomical observatory in the city belongs to this institution, and it likewise possesses an extensive philosophical apparatus.

The Pennsylvania Hospital was established in 1752, and is the most respectable institution of the kind in the union. The whole extent of the buildings from east to west is 278 feet, and detached from the hospital is another building of three stories, calculated to accommodate forty or fifty patients. The number of patients is usually from 190 to 220, including ninety lunatics. There are belonging to the hospital a valuable anatomical museum, and a library of about 4500 volumes. In 1817 a handsome building was erected for the accommodation of the celebrated painting of Mr. West, representing Christ

healing the sick. This painting is a source of a handsome income to the hospital.

The university of Pennsylvania was erected into a university, upon the foundation of what was denominated the Academy and Charity School, and it is chartered as a complete university. The board of trustees, who are twenty-four in number, have the power of appointing professors in all the branches of science. The establishment consists at present of four departments of arts, medicine, natural science, and law, in each of which lectures are given, and a system of instruction is established. Connected with the university are the academy, in which youth are instructed in the learned languages, preparatory to college, and a charity school for the education of poor children.

A large edifice, built for the accommodation of the president of the United States, is occupied by the university. The building devoted to the faculty of arts has excellent lecture rooms, and a large hall for public exercises. The apparatus belonging to the college is said not to be surpassed by any other of the kind in the country. The library contains 3000 or 4000 volumes. The offices in the department of arts are a provost, who is also a professor of moral philosophy and belles lettres; a vice provost, who is also a professor of mathematics and natural philosophy, and a professor of languages. The number of undergraduates is about forty. The course of education is completed in three years.

Philadelphia Stones, a name which some authors have given to what are otherwise called Christian bones found in the walls of the Natolian city of this name. It is a vulgar error that these walls are built of bones; the tradition of the country being that when the Turks took the place they fortified it for themselves, and built their walls of the bones of the Christians whom they killed there. This idle opinion gained credit merely from a loose and porous stone of the sparry kind being found in an old aqueduct in the wall. Sir Paul Rycaut brought home pieces of these stones, which he supposed to have been bones; but they proved on examination to be various bodies, chiefly vegetable, incrusted over and preserved in a spar of the nature of that which forms incrustations in Knaresborough spring, and other places with us. These bodies are often cemented together in considerable numbers by this matter, and their true shape lost in the congeries.

Philadelphian Society, in ecclesiastical history, an obscure and inconsiderable society of mystics, formed about the end of the seventeenth century by an English female fanatic, whose name was Leadley. This woman induced by her visions, predictions, and doctrine, several persons of learning to become her disciples. She believed that all dissensions among Christians would cease, and the kingdom of the Redeemer become a scene of charity and felicity, if Christians, disregarding the forms of doctrine or discipline of their several communions, would all join in committing their souls to the care of the internal guide, to be instructed, governed, and formed by his divine impulse and suggestions. But she went farther: and pretended a divine commission to proclaim the approach of this glorious communion of saints. One of her leading doctrines was that of the final restoration of all intelligent beings to perfection and happiness.

PHILADELPHUS, in antiquity, from the Greek φιλος, lover, and αδελφος, brother; a title or surname of several ancient kings. See Ptolemy and Egypt.

Philadelphus, in botany, the pipe-tree, or mock orange; a genus of the monogynia order, and icosandria class of plants; natural order nineteenth, hesperideæ.

1. P. coronarius, white syringa, or mock orange, has been long cultivated in the gardens of this country as a flowering shrub: it is not well known in what country it is to be found native. It rises seven or eight feet high, sending up a great number of slender stalks from their root. These have a gray bark, branch out from their sides, and are garnished with oval spear-shaped leaves. These last have deep indentures on their edges; their upper surface being of a deep green, but the under surface pale, with the taste of a fresh cucumber. The flowers are white, and come out from the sides and at the ends of the branches in loose bunches, each standing on a distinct foot-stalk: they have four oval petals, which spread open, with a great number of stamina within, surrounding the style. This shrub, by its flowers, makes a fine figure in May and June; for they are produced in clusters both at the end and from the sides of the branches. They are of a fine white color, and exceedingly fragrant. The petals of which each is composed are large, and spread open like those of the orange; and then forming branches, which stand each on its own separate foot-stalk,. and being produced in plenty all over the shrub, feast at once both the eye and the smell. These flowers. however, are very improper for chimneys, water-glasses, &c., in rooms, as their scent will be too strong. The double-flowering syringa is a variety seldom rising above a yard high. The leaves and branches are also proportionally smaller and more numerous, and the bark of the shoots of a lighter brown, than in the other. It sometimes produces flowers with three or four rows of petals; whence the name. They are much smaller than those of the other, and flourish only once in five years, which makes it hardly worth propagating. The dwarf syringa is still of lower growth, seldom arising to more than two feet in height; and the branches and leaves are smaller and more numerous, and the bark is of a lighter brown. It never produces flowers.

2. P. inodorus, the Carolina syringa, with entire leaves, is a native of Carolina, and as yet but little known in Europe. It rises with a shrubby stalk of about sixteen feet in height, sending out slender branches from the sides opposite, garnished with smooth leaves shaped like those of the pear-tree, and standing on pretty long foot-stalks. The flowers are produced at the ends of the branches; and are large, white, spreading open, with a great number of short stamina with yellow summits. This is the tallest grower by far of the species, and makes the

grandest show when in blow, though the flowers have no smell.

3. P. nanus, with oval leaves somewhat indented, and double flowers, seldom rises above three feet; the flowers come out singly from the sides of the branches, and have a double or treple row of petals, of the same size and form, as well as the same scent, with No. 1; but it flowers very rarely. The propagation of all the sorts is very easy. 1. The most certain method is by layers; for the young twigs, being laid in the earth in winter, will be good rooted plants by autumn following. 2. These plants may be increased by cuttings, which being planted in October, in a shady moist border, many of them will grow; though it will be proper to let those of the Carolina sort remain until spring, and then to plant them in pots, and help them by a little heat in the bed. By this assistance, hardly one cutting will fail. 3. They may be also increased by suckers; for all the sorts throw out suckers, though the Carolina syringa the least of any. These will all strike root, and be fit for the nursery ground: nay, the double-flowering and the dwarf sorts are always increased this way; for these plants, having stood five or six years, may be taken up and divided into several scores. All the plants, however, whether raised from layers, cuttings, or suckers, should be planted in the nursery to get strength, before they are set out for good. They should be planted a foot asunder, and the distance in the rows should be two feet. After this, they will require no other care than hoeing the weeds, until they have stood about two years, which will be long enough for them to stand there.

PHILÆ, a town and island of Egypt, above the smaller cataract, but placed opposite Syene, by Pliny; v. c. 9.

PHILÆ, one of the Sporades Isles.

PHILÆNI, two brothers, citizens of Carthage, who sacrificed their lives for the good of their country. When the Carthaginians ruled over the greatest part of Africa, the Cyrenians were also a great and wealthy people. The country between them was sandy, and of a uniform appearance. There was neither river nor mountain to distinguish their limits, which engaged the two nations in terrible and tedious wars. At last they agreed, 'that, upon a day appointed, deputies should set out from their respective homes, and the place where they met one another should be accounted the common boundary of both nations.' Accordingly, the Philæni, sent from Carthage, made all despatch to perform their journey. The Cyrenians proceeded more slowly. These last, perceiving themselves behind, charged the Carthaginians with setting out before the time; and made a mighty bustle upon it. The Carthaginians then desired any other terms; on which the Greeks made this proposal to the Carthaginians, 'either to be buried alive in the place which they claimed as the boundary to their nation, or that they would advance forward to what place they chose upon the same condition.' The Philæni, accepting the offer, made a sacrifice of their lives to their country, and were buried alive. The Carthaginians dedicated altars in that place to the memory of the two brothers. These altars, called Aræ Philænorum, served as a boundary to the empire of the Carthaginians, which extended from this monument to Hercules's Pillars, which is about 2000 miles, or, according to the accurate observations of the moderns, only 1420 geographical miles. Sallust. de Bell. Jug.

PHILÆUS, the son of Ajax by Lyside, daughter of Coronus, one of the Lapithæ; and a lineal ancestor of Miltiades.

PHILÆUS, the son of Augeas, king of Elis, whom Hercules placed on the throne after killing his father.

PHILANTHROPOS, from φιλεω, to love, and ανθρωπος, a man; so called from its uses. 1. A medicine which relieves the pain of the stone. 2. The herb goose-grass, because it sticks to the garments of those who touch it.

PHILAN'THROPY, *n. s.* } Gr. φιλεω and PHILAN'THROPIST. } ανθρωπος. Love of mankind; good nature: a lover of mankind.

Such a transient temporary good nature is not that *philanthropy*, that love of mankind, which deserves the title of a moral virtue. *Addison.*

The sufferings which he underwent, and was witness to, on this occasion, made an impression upon his mind that probably was a principal cause of the *philanthropical* exertions which afterwards employed so great a portion of his life. *Aikin.*

PHILANTHROPHY is of nearly the same import with benevolence; and differs from friendship, as this last affection subsists only between individuals, whilst philanthropy comprehends the whole human species. Whether man has an instinctive propensity to love his species, which makes him incapable of happiness but in the midst of society, and impels him to do all the good that he can to others, feeling their felicity an addition to his own, is a question that has been warmly debated among philosophers. Among the philosophers of the seventeenth century, Hobbes took the unpopular side of this question; insisting that man is naturally a selfish animal, incapable of any generous principle. Lord Shaftesbury adopted the opposite side, and has been since followed by bishop Butler, Hutchinson, lord Kames, Dr. Beattie, Dr. Reid, &c., who insist that the whole duty of man results from an intuitive principle called the moral sense, from which philanthropy is inseparable. See MORAL PHILOSOPHY.

PHILATES, or FILATES, a town of Albania, pachalic of Delvino, on the ascent of Mount Montzkeli, near the small river Calamas. It is the chief place of a canton of this name. Population 2000. Twenty-five miles west by south of Joannina.

PHILBERT DE GRAND-LIEU, a village in the west of France, on the northern bank of the lake of Grand Lieu. Population 2000. Fifteen miles south by west of Nantes.

PHILELPHUS (Francis), professor of eloquence at Padua, was born in 1398. In 1429 he was sent by the republic of Venice to Constantinople, where he married the daughter of the learned Emmanuel Chrysoloras. The emperor John Paleologus sent him to the emperor Sigismund to ask assistance against the Turks. He was very learned. He died at Florence, in

1481. His works were printed at Basil, in 1739, folio.

PHILEMON, a Greek comic poet, son to Damon, and contemporary with Menander. Any advantage he had over this poet was owing less to his own merit than to the intrigues of his friends. Plautus has imitated his comedy of the Merchant. He is reported to have died laughing on seeing his ass eat figs. He was then about ninety-seven years of age.

PHILEMON the younger, son of the above, was also the author of fifty-four comedies, of which there are still extant considerable fragments collected by Grotius. These prove that he was not a poet of the first rank. He flourished about A. A. C. 274.

PHILEMON, a rich citizen of Colossæ in Phrygia, who was converted to the Christian faith, with Appia his wife, by Epaphras the disciple of St. Paul. Coloss. ii. 1. Perhaps we should have known nothing of Philemon had it not been on account of his slave Onesimus, who, having robbed and run away from him, came to Rome, where he found St. Paul, and was very serviceable to him. St. Paul converted and baptised him, and sent him back to his master Philemon; to whom he wrote a letter, still extant, which passes for a masterpiece of pathetic eloquence, and is at once natural, lively, and strong. Philemon (1, 2), had convened a church in his house; and all his domestics, as well as himself, were members. His charity, liberality, and compassion, were a sure refuge to all that were in distress. The Apostolical Constitutions say that St. Paul made him bishop of Colossæ; but the Menæa insinuate that he went to Gaza in Palestine, of which he was the apostle and first bishop. Thence he returned to Colossæ, where he suffered martyrdom, with his wife, in the time of Nero.

PHILENE, a town of Attica, between Athens and Tangara.—Stat. Theb. iv. 102.

PHILEROS, a town of Macedonia.—Pliny.

PHILETÆRUS, a eunuch, who was made governor of Pergamus by Lysimachus, whom he afterwards quarrelled with, and made himself king of that country, A. A. C. 283. See PERGAMUS. He reigned twenty years, and was succeeded by his nephew Eumenes I.

PHILETAS, a Greek poet and grammarian, of the island of Cos, who flourished under Philip and Alexander the Great, and was preceptor of Ptolemy Philadelphus. He was the author of some Elegies, Epigrams, and other works, which are not extant. He is celebrated by Ovid and Propertius, as one of the best poets of his age.

PHILETUS, a man mentioned by St. Paul, in his second epistle to Timothy, ii. 16, 17, 18, along with Hymenæus, as persons who had erred, and denied the resurrection. We have nothing very certain concerning Philetus, but a fabulous story by Abdias, in the life of St. James major, which attributes his conversion to that apostle.

PHILIATRA, PHILATREA, or FILATRA, a small town in the south-west of the Morea, in Messenia, about two miles from the sea. It is situated in a district interspersed with olives and fruit trees; the houses being scattered, but beautifully intermixed with gardens and vineyards. Six miles south-west of Arcadia.

PHILIBEG, a little plaid, called also a kilt, is a sort of short petticoat reaching nearly to the knees, worn by the Scotch Highlanders. It is a modern substitute for the lower part of the plaid, being found to be less cumbersome, especially in time of action, when the Highlanders used to tuck their brechdan into their girdle. Almost all of them have a great pouch of badger and other skins, with tassels dangling before, in which they keep their tobacco and money.

PHILIDAS, a friend of Pelopidas, one of those who joined in the conspiracy to expel the Spartans from Thebes, and in whose house they met.

PHILIDOR (Andre), a musician of Dreux, in France, was the son of Michael Danican, chamber musician to Louis XIII., and changed his name to Philidor, from a compliment paid him by that monarch, who once called him so after a famous hautbois player. He procured his son, who was born in 1726, the situation of a page, and he composed a successful mottet, with full choruses, in his twelfth year. As he grew up, his passion for the game of chess discovered itself, and in order to indulge it he travelled over great part of Europe, but by no means abandoning his musical studies. About the year 1753 he came to London, when he set to music Dryden's Alexander's Feast, an attempt which is said to have elicited the approbation of Handel. He continued in England some time, and here first printed his Analysis of Chess, a book still considered a standard work. On his return to France he became chapel-master to the queen, and devoted his attention to the comic opera. There are twenty-one operatic pieces all of his composition, one of which, Le Maréchal, in 1761, ran more than 100 nights. Philidor afterwards returned to England, and set the Carmen Seculare, esteemed the best of his works. His death took place in London in 1795. A short time previously he played two games of chess at the same time, blindfold, against two of the most distinguished amateurs, one of which he won; and the other was a drawn game.

PHILINUS, a native of Agrigentum, who fought along with Hannibal against the Romans. He wrote a history of the Punic wars.—C. Nep. Polyb.

PHILIP, the apostle, a native of Bethsaida in Galilee. It is supposed that he and Nathanael were present at the marriage at Cana. In the Upper Asia this apostle took great pains in planting the gospel, and by his preaching and miracles made many converts. In the latter part of his life, we are told, he came to Hierapolis in Phrygia, a city addicted to idolatry, and particularly to the worship of an immense serpent. St. Philip by his prayers procured the death of this monster, and convinced its worshippers of the absurdity of paying divine honors to creatures. But the magistrates, enraged at Philip's success, imprisoned him, and ordered him to be severely scourged, and then put to death, which some say, was by crucifixion; others, by hanging him up against a pillar. St. Philip is generally reckoned among the married apostles; and it is said he had three daughters, two of whom preserved their virginity, and died at Hierapolis; the third died at Ephesus. The pretended gospel, under

his name was forged by the Gnostics, to countenance their bad principles and worse practices. The Christian church observes his festival, with that of St. James, on the first day of May.—Euseb. lib. iii. c. 30.

Philip, the second of the seven deacons, was chosen by the apostles after our Saviour's resurrection.—Acts vi. 5. This deacon, they say, was of Cæsarea in Palestine. It is certain that his daughters lived in this city.—Acts xxi. 8, 9. The modern Greeks say, that he went to Tralles in Asia, where he founded a church, of which he was the apostle and bishop; and where he rested in peace, after performing many miracles. The Latins, on the contrary, state that he died at Cæsarea, and that three of his daughters were there buried with him. It is thought that the eunuch converted by St. Philip was the first apostle of the Ethiopians; and the Abyssinians boast of having received the Christian faith from him.

Philip I., king of Macedonia. See Macedon.

Philip II., king of Macedon, was the fourth son of Amyntas II. He was sent to Thebes as an hostage by his father, where he learned the art of war under Epaminondas, aud studied the manners and pursuits of the Greeks. He discovered, from his earliest years, that quickness of genius and greatness of courage which afterwards procured him so great a name. On the death of his brother Perdiccas III. he ascended the throne as guardian of his nephew Amyntas III., whom he got deposed, and succeeded about A. A. C. 360. The principal transactions of his life and reign being related under Macedon, it is only necessary here to add a few characteristical anecdotes of him.—He was the first who caused gold to be coined in his name; and is said to have employed his wealth in procuring spies and partisans in all the great cities of Greece; thus making conquests without the aid of arms. At the siege of Methone, in Thrace, he received a wound in his right eye by an arrow; which was inscribed with the words, 'For Philip's right eye.' After the archer, who had shot it, had offered his services to Philip, boasting that he could hit the swiftest bird on the wing, Philip ridiculed his art by saying, 'that he would be of use, if they were to make war with starlings;' which made Aster join the enemy, and take this method of revenge. By assuming the mask of a moderator and peace-maker, he gained confidence; in attempting to protect the Peloponnesians against the encroaching power of Sparta, he rendered his cause popular; and, by ridiculing the insults offered to his person as he passed through Corinth, he displayed his moderation and philosophic virtues. In his attempts to make himself master of Eubœa, he was unsuccessful; and Phocion, who despised his gold as well as his meanness, obliged him to evacuate an island whose inhabitants were as insensible to the charms of money as they were unmoved at the horrors of war, and the bold efforts of a vigilant enemy. From Eubœa he turned his arms against the Scythians; but the advantages he obtained over that indigent nation were inconsiderable, and he again made Greece an object of plunder and rapine. His behaviour after the battle of Chæronea reflects great disgrace upon him as a man and as a monarch. In the honr of festivity, and during the entertainment he had given to celebrate his victories, Philip sallied from his camp, and with the inhumanity of a brute, insulted the bodies of the slain, and exulted over the calamities of the prisoners. His insolence, however, was checked, when Demades, one of the Athenian captives, exclaimed, 'Why do you, O king, act the part of a Thersites, when you can represent with so much dignity the elevated character of an Agamemnon?' The reproof was felt; Demades received his liberty; and Philip learned to gain popularity even among his fallen enemies, by relieving their wants and easing their distresses. At the battle of Chæronea the independence of Greece was extinguished; and Philip formed new enterprises, and meditated new conquests, being appointed general of the Greeks against the Persians. But he was stopped in the midst of his warlike preparations, being stabbed by Pausanias as he entered the theatre at the celebration of the nuptials of his daughter Cleopatra. This murder has given rise to many conjectures. Many consider the repudiation of Olympias and the resentment of Alexander as the causes. The ridiculous honors which Olympias paid to her husband's murderer strengthened the suspicions against the queen; but Alexander declared that he invaded Persia to revenge his father's death upon the Persian princes, by whose intrigues the assassination had been committed. The character of Philip was that of a sagacious, artful, prudent, and intriguing monarch: he was brave in the field, eloquent and dissimulating at home, and he possessed the art of changing his conduct according to the caprices of mankind, without ever altering his purpose, or losing sight of his ambitious aims. He possessed much perseverance, and in the execution of his plans he was always vigorous. He had that eloquence which is inspired by strong passions. His assassination prevented him from achieving the greatest of his undertakings; otherwise he might have acquired as many laurels, and conquered as many nations, as his son Alexander did; and Persia might have been added to the Macedonian empire, perhaps with greater moderation, with more glory, and with more lasting advantages. The private character of Philip raises indignation. The admirer of his virtues is disgusted to find him disgracing himself among the most abandoned prostitutes, as well as by the most unnatural crimes and lascivious indulgences. He was murdered in the forty-seventh year of his age, and the twenty-fourth of his reign, about 336 years before the Christian era. His reign is interesting, and his administration a matter of instruction. He is the first monarch whose life and actions are described with accuracy and historical faithfulness. Philip was the father of Alexander the Great and of Cleopatra by Olympias; he had also by Audaca an Illyrian, Cyna, who married Amyntas, the son of Perdiccas, Philip's elder brother; by Nicasipolis a Thessalian, Nicæa, who married Cassander; by Philæna, a Larissæan dancer, Aridæus, or Philip III., who reigned some time after Alexander's death; by Cleopatra, the niece of Attalus, Caranus and Europa, who

were both murdered by Olympias; and Ptolemy, the first king of Egypt, by Arsinoe, who in the first month of her pregnancy was married to Lagus. Of the many memorable sayings reported by Plutarch of this prince, the following are the most remarkable:—A poor woman had often importuned him to do her justice, but was told that he had no time to attend to her petition; whereupon she said with some warmth, 'Cease then to be a king.' Philip felt the force of this reproof, and immediately gave her satisfaction. Another woman came to ask justice from him as he was going out from a great entertainment, and was condemned: 'I appeal,' exclaimed she—'And to whom do you appeal?' said the king, 'To Philip fasting.' This answer opened the eyes of the monarch, who retracted his sentence. If he possessed any virtue it was that of suffering injuries with patience. Having learned that some Athenian ambassadors charged him, in full assembly, with atrocious calumnies: 'I am under great obligations,' said he, 'to those gentlemen, for I shall henceforwards be so circumspect in my words and actions, that I shall convict them of falsehood.' One saying of Philip, however, does him less honor than those above mentioned, viz.—'Let us amuse children with playthings, and men with oaths.' This abominable maxim gave rise to the observation, 'That he was in full length, what Louis XI. afterwards was in miniature.' It is well known that Philip had a person about him, who called out at times, 'Philip, remember that thou art mortal;' but whether we should place this to the account of his pride or his humility it is difficult to determine.

Philip III. and IV. two short-lived monarchs of Macedonia. See Macedon.

Philip V., king of Macedon, was the son of Demetrius. His infancy, at the death of his father, was protected by Antigonus, one of his friends, who ascended the throne, and reigned for twelve years with the title of independent monarch. When Antigonus died, Philip recovered his father's throne, though only fifteen years of age, and he early distinguished himself by his boldness and his ambitious views. He came to the throne in the year 220 before our Saviour, and the beginning of his reign was rendered glorious by the conquests of Aratus; a general who was as eminent for his love of justice as his skill in war. But so virtuous a character could hardly fail to be disagreeable to a prince who indulged himself in every species of dissipation and vice; and his cruelty to him soon displayed his character in its true light; for, to the gratification of every vice, he had the meanness to sacrifice this faithful and virtuous Athenian. Not satisfied with Macedonia, Philip aspired to become the friend of Annibal, to share with him the spoils which the distresses of the Romans seemed to promise. But his expectations were frustrated; the Romans discovered his intrigues; and, though weakened by the valor of the Carthaginians, they were soon enabled to meet him in the field of battle. The consul Lævinus entered Macedonia; obtained a victory over him near Apollonia, reduced his fleet to ashes, and compelled him to sue for peace. This was not permanent; and when the Romans discovered that he had assisted their formidable enemy Annibal with men and money, they appointed T. Q. Flaminius to punish his perfidy. The Roman consul, in a general engagement, fought near Cynocephale, totally defeated the monarch, who saved his life by flight, and was obliged to demand peace by his ambassadors, which was granted with difficulty. In the midst of these public calamities the peace of his family was disturbed; and Perseus, the eldest of his sons by a concubine, raised suspicions of his brother Demetrius, whose condescension and humanity had gained popularity among the Macedonians, and who, from his residence at Rome as an hostage, had gained the good graces of the senate. Philip listened to the false accusations of Perseus, that Demetrius wished to rob him of his crown. But, no sooner was Demetrius sacrificed to credulity, than Philip became convinced of his rashness; and, to punish the perfidy of Perseus, he attempted to make Antigonus, another son, his successor. But he was prevented by death, in the forty-second year of his reign, A. A. C. 178.

Philip, a native of Acarnania, physician to Alexander the Great. When that monarch had been suddenly taken ill, after bathing in the Cydnus, Philip undertook to remove the complaint, when the rest of the physicians believed that all medical assistance would be ineffectual. But, as he was preparing his medicine, Alexander received a letter from Parmenio, in which he was advised to beware of his physician Philip, as he had conspired against his life. The monarch was alarmed; and, when Philip presented him the medicine, he gave him Parmenio's letter to peruse, and began to drink the potion. The serenity and composure of Philip's countenance, as he read the letter, removed every suspicion from Alexander's breast; he pursued the directions of his physician, and in a few days recovered.

Philip, foster-brother of Antiochus Epiphanes (1 Macc. vi. 14. and 55; 2 Macc. ix. 29), was a Phrygian by birth, and very much in Antiochus's favor. This prince made him governor of Jerusalem (2 Macc. viii. 8; v. 22), where he treated the Jews very cruelly, to force them to forsake their religion. Seeing that Apollonius and Seron were defeated by Judas Maccabæus, he sent for new succours to Ptolemy governor of Cœlo-Syria, who sent him Gorgias and Nicanor with a powerful army. Some time after, Antiochus going beyond the Euphrates, to extort money from the people, Philip went along with him; and Antiochus finding himself near his end (1 Macc. vi. 14) made him regent of the kingdom, put his diadem into his hands, his royal cloak, and his ring, that he might render them to his son the young Antiochus Eupator. But Lysias having taken possession of the government in the name of the young Eupator, who was but a child, Philip not being able to cope with him, durst not return into Syria; but he went into Egypt, carrying the body of Epiphanes along with him, to implore assistance from Ptolemy Philometor against Lysias the usurper of the government of Syria. The year following, while Lysias was busy in the war carrying on

against the Jews, Philip got into Syria, and took possession of Antioch: but Lysias returning into the country, with great diligence, retook Antioch, and put Philip to death, who was taken in the city.

PHILIP (M. Julius), a Roman emperor, of an obscure family in Arabia, whence he was surnamed the Arabian. From the lowest rank in the army he gradually rose to the highest offices; and, when he was made general of the pretorian guards, he assassinated Gordian to make himself emperor. To secure himself on the throne, he left Mesopotamia a prey to the continual invasions of the Persians, and hurried to Rome, where his election was approved by the senate and people. Philip rendered his cause popular by his liberality and profusion; particularly on occasion of the centenary commemoration of the foundation of the city; which was celebrated with more magnificence than under the preceding reigns. His usurpation, however, was short. He was defeated by Decius, who had proclaimed himself emperor in Pannonia; and was assassinated by his own soldiers near Verona, in the forty-fifth year of his age, and fifth of his reign. His son, who had shared with him the imperial dignity, was also massacred in the arms of his mother. Young Philip was then in the twelfth year of his age, and the Romans lamented in him the loss of rising talents, of natural humanity, and endearing virtues.

PHILIP I., king of France, succeeded his father Henry I. in 1060, when only eight years of age, under the guardianship of Baldwin V. count of Flanders, who discharged his trust with zeal and fidelity. He defeated the Gascons who were inclined to revolt, and died leaving his pupil fifteen years of age. This young prince made war in Flanders against Robert, Baldwin's younger son, who had invaded Flanders, which belonged to the children of his elder brother. Philip marched against him with a numerous army, which was cut to pieces near Mount Cassel: and the conqueror enjoyed his usurpation. Philip, after this, tired of his wife Bertha, and fond of Bertrade, wife of Folques count of Anjou, carried her off from her husband. Having, in 1093, annulled his own marriage, as well as Bertrade's with the count of Anjou, both under pretext of barrenness, Philip and she were married by the bishop of Beauvais. This union was declared void by pope Urban II., a Frenchman by birth, who pronounced the sentence in France, to which he had come for an asylum. Philip, fearing the pope's anathemas might excite his subjects to rebel, sent deputies to the pope, who obtained a delay, with permission to use the crown. This delay was not of long duration. Philip was excommunicated anew in a council held at Poictiers in 1100; but, in 1104, Lambert bishop of Arras, legate of pope Pascal II., at last brought him his absolution to Paris, after having made him promise never to see Bertrade more; a promise which he did not keep. It would appear that the pope afterwards approved their marriage; for their sons were declared capable of succeeding. Philip died at Melun the 29th of July, 1108, aged fifty-seven. See FRANCE.

PHILIP II., surnamed Augustus, with other vain titles (see FRANCE), son of Louis VII. and of Alix his third wife, daughter of Thibault count of Champagne, was born the 22d of August, 1165. He came to the crown after his father's death in 1180, at the age of fifteen. The king of England seemed willing to take advantage of his minority, and to seize upon a part of his dominions. But Philip marched against him, and compelled him, sword in hand, to confirm the ancient treaties between the two kingdoms. As soon as the war was ended, he made his people enjoy the blessings of peace. He gave a check to the oppressions of the great lords, banished the comedians, punished blasphemies, caused the streets and public places at Paris to be paved, and annexed to that capital a part of the adjacent villages. It was enclosed by walls with towers; and the inhabitants of other cities were equally proud to fortify and embellish theirs. The Jews having for a long time practised the most shameful frauds in France, Philip expelled them from his kingdom, and declared all debts due to them cancelled. The tranquillity of France was disturbed by a difference with the count of Flanders, which was terminated in 1184. Some time after he declared war against Henry II. of England, and took from him the towns of Issoudun, Tours, Mans, and other places. The epidemical madness of the crusades then agitated all Europe; and Philip caught the infection. He embarked in 1190 with Richard I., king of England, for the relief of the Christians in Palestine, who were oppressed by Saladin. These two monarchs now sat down before Acre, the ancient Ptolemais; as did almost all the Christians of the east, while Saladin was engaged in a civil war on the banks of the Euphrates. Their forces, joined to those of the Asiatic Christians, were above 300,000 fighting men. Acre surrendered the 13th of July, 1191; but the disagreement, which took place between Philip and Richard, did more mischief than could be compensated by 300,000 heroes. Philip returned to France, with a languishing disorder, which was attributed to poison, but which might have been occasioned merely by the scorching heat of a climate so different from that of France. He lost his hair, his beard, and his nails; his very flesh came off. The year after he obliged Baldwin VIII., count of Flanders, to leave him the county of Artois. He next turned his arms against Richard king of England, from whom he took Evreux and Vexin; though he had promised upon the gospels never to take any advantage of his rival during his absence. Philip, repulsed from Rouen with loss, made a truce for six months; during which he married Ingelburga, princess of Denmark, whose beauty could only be equalled by her virtue. The divorcing of this lady, whom he quitted to marry Agnes daughter of the duke of Merania, embroiled him with the court of Rome. The pope excommunicated him, but restored him upon his promising to take back his former wife.

John succeeded to the crown of England in 1199, to the prejudice of his nephew Arthur, to whom of right it belonged. The nephew, supported by Philip, took arms against the uncle,

but was defeated in Poitou, where he was taken prisoner, and afterwards murdered. The murderer, king John, being summoned before the peers of France, not having appeared, was declared guilty of his nephew's death, and condemned to lose his life, in 1203. His lands, situated in France, were forfeited to the crown. Philip seized upon Normandy, carried his victorious arms into Maine, Anjou, Touraine, Poitou, and united those provinces once more to the crown of France. The English had no other part of France but the province of Guienne. To crown his good fortune, John was embroiled with the court of Rome. This ecclesiastical thunder was very favorable for Philip. Innocent II. transferred to him a perpetual right to the kingdom of England. To give the greater force to the sentence, he employed a whole year in building ships, and in preparing the finest army that was ever seen in France. Europe was in expectation of a decisive battle between the two kings, when the pope laughed at both, and artfully took to himself what he had bestowed upon Philip. A legate persuaded John to give his crown to the court of Rome. Then Philip was expressly forbid by the pope to make any attempt upon England, now become a see of the Roman church, or against John, who was under her protection. Meanwhile Philip's great preparations had alarmed all Europe; Germany, England, and the Netherlands were united against him. Ferrand, count of Flanders, Philip's vassal, joined the emperor. Philip was not disconcerted; his valor was conspicuous at the battle of Bouvines, on the 27th of July, 1214, which lasted from noon till night. Before the engagement, he had made even some of his nobles, who followed him with reluctance, zealous in his cause. The enemy had an army of 150,000 fighting men; that of Philip was not half so numerous; but it was composed of the flower of his nobility. The king run great hazard of his life; for he was thrown down under the horses' feet, and wounded in the neck. It is said 30,000 Germans were killed. The counts of Flanders and Boulogne were led to Paris in irons. The French king made no conquests on the side of Germany after this ever memorable action; but it gained him an additional power over his vassals. Philip conqueror of Germany, and possessor of almost all the English dominions in France, was invited to the crown of England by the subjects of king John, who were grown weary of his tyranny. Upon this occasion he acted like an able politician. He persuaded the English to ask his son Louis for their king. Louis made a descent upon England, was crowned at London, and excommunicated at Rome, in 1216. See ENGLAND. King John's death extinguished the resentment of the English, who, having declared themselves for his son Henry III., forced Louis to leave England. Philip died at Nantes, the 14th of July, 1223, aged fifty-nine, after a reign of forty-three years. Of all the kings of the third race, he made the greatest accession to the crown lands, and transmitted the greatest power to his successors. He reunited to his dominions Normandy, Anjou, Maine, Touraine, Poitou, &c. After having subdued John he humbled the great lords, and by the overthrow of foreign and domestic enemies took away the counterpoise which balanced his authority. He was more than a conqueror; he was a great king and an excellent politician; fond of splendor on public occasions, but frugal in private life; exact in the administration of justice: skilful in employing alternately flattery and threatenings, rewards and punishments; zealous in the defence of religion and the church; but he knew well how to procure from her succours for the state. The enterprises of Philip were almost always successful; he formed his projects with deliberation, and executed them with dispatch. He began by rendering the French happy, and in the end formidable; and though he was more inclined to punish than to pardon, he was regretted by his subjects, as a great monarch, and as the father of his country.

PHILIP VI., the first king of France of the collateral branch of Valois, was son to Charles count of Valois, brother of Philip IV. He mounted the throne in 1328, on the death of his cousin Charles IV., after having held the regency. France was much divided in the beginning of his reign by disputes about the succession. Edward III. of England laid claim to it as grandson of Philip IV. by his mother; but Philip of Valois took possession of it as first prince of the blood. He marched to the relief of his vassal the count of Flanders, whose subjects, on account of bad usage, had taken up arms against him. He engaged the rebels at Cassel, performed prodigies of valor, and gained a signal victory on the 24th of August 1328. Having made all quiet, he devoted the time of peace to the internal regulations of his kingdom. The financiers were called to an account, and some of them condemned to death; among others Peter Remi, general of the finances, who left behind him nearly £20,000,000. He afterwards enacted various laws respecting freeholds, the appeal comme d'abus, &c., the principles of which are more ancient than the name. The year 1329 was distinguished by a solemn homage paid to Philip, by Edward III. of England, for the duchy of Guienne, upon his knees, and with his head uncovered. The interior peace of the kingdom was disturbed by disputes about the distinction of the church and state. This controversy laid the foundation of all the disputes afterwards agitated about the authority of the two powers; which contributed to confine the ecclesiastical jurisdiction within narrower limits. Soon after, Edward III. declaring war against France, he recovered those parts of Guienne of which Philip was in possession. The Flemings, having again revolted from France, joined the standard of Edward; and required that he would assume the title of king of France, in consequence of his claim to the crown; as then, agreeably to the letter of their treaty, they only followed the king of France. From this period is dated the union of the fleur-de-lis and leopards in the arms of England. Philip's arms were at first attended with some success; but those advantages were far from compensating the loss of the battle of Sluys or Ecluse, in which the French fleet, consisting of 120 large ships, and manned by 40,000 seamen, was beat by that of

England in 1340. This war, which had been alternately discontinued and renewed, began again with fury in 1345. The two armies having come to an engagement the 26th of August, 1346, near Crecy, in Ponthieu, the English gained a signal victory. See CRESSY. *The loss of Calais, and several other places, was the fruit* of this defeat. Some time before, Edward had challenged Philip of Valois to a single combat; which he refused, not from cowardice, but from the idea that it was improper for a sovereign prince to accept a challenge from a king who was his vassal. At length, in 1347, a truce for six months was concluded between France and England, and afterwards prolonged at different times. Philip died 23d August, 1350. He had, however, reunited Dauphiny to France. See DAUPHINY. Philip likewise added to his domain Rousillon, and a part of Cerdagne, by lending some money to the king of Majorca, who gave him those provinces as a security; provinces which Charles VIII. afterwards restored without any reimbursement. The fictitious and ideal value of the coin was also raised, and a great deal of bad money was issued from the mint. The officers of the mint were sworn upon the gospels to keep the secret; but Philip was a fool to think that so gross a fraud would not be discovered.

PHILIP I., king of Spain, was the son of the emperor Maximilian I. In 1490 he married Jane, or Joan, queen of Spain, in whose right he obtained that crown. He died in 1506, aged twenty-eight; and was succeeded by his son Charles V. See SPAIN.

PHILIP II., son of Charles V. and Isabella of Portugal, was born at Valladolid on the 21st of May 1527, and became king of Naples and Sicily by his father's abdication in 1554. He ascended the throne of Spain on the 17th of January 1556. Charles had made a truce with the French, but his son broke it; and, having formed an alliance with England, poured into Picardy an army of 40,000 men. The French were cut to pieces at the battle of St. Quintin, on the 20th of August 1557. That town was taken by assault, and the day on which the breach was mounted Philip appeared armed cap-a-pie to animate the soldiers. It was the first and last time that he ever wore this military dress. His terror was so great during the action that he made two vows; one, that he would never again be present in a battle; and the other, to build a magnificent monastery to St. Lawrence, to whom he attributed the success of his arms, which he executed at Escurial, about seven leagues from Madrid. The taking of Chatelet, Ham, and Noyon, were the only advantages derived from a battle which might have proved the ruin of France. The duke of Guise repaired the disgrace of his country by the taking of Calais and Thionville. While he was animating the French, Philip gained a battle against marshal de Thermes, near Gravelines. His army was commanded by count Egmont, whom he afterwards caused to be beheaded. He made no better use of the victory of Gravelines than he had done of that of St. Quintin; but he reaped advantage from the peace of Chateau Cambresis, *the master-piece of his politics. By that treaty, concluded the 13th April, 1559, he gained pos*session of Thionville, Marienbourg, Montmedi, Hesdin, and the county of Charolois. This war, *so terrible, and attended with so much cruelty, was terminated, like many others, by a marriage. Philip took for his third wife Elizabeth, daughter* of Henry II., who had been promised to his own son, prince Charles, and returned in triumph to Spain, without having drawn a sword. His first care, upon his arrival at Valladolid, was to demand of the grand inquisitor an auto da fé. This was immediately granted to him; forty victims were strangled and burnt. One of them, Don Carlos de Seza, ventured to draw near to the king, and said to him, 'How, Sir, can you suffer so many wretches to be committed to the flames? Can you be witness of such barbarity without weeping?' To this Philip replied, 'If my own son were suspected of heresy, I would myself give him up to the severity of the inquisition. If an executioner were wanting, I would supply his place myself.' On other occasions he conducted himself agreeably to this intolerant spirit. At length the Flemings, no longer able to bear so hard a yoke, revolted. The revolution began with the large provinces of the continent; but the maritime provinces only obtained their liberty. In 1579 they formed themselves into a republic, under the title of the UNITED PROVINCES, which see.

Philip sent the duke of Alba to reduce them; but the cruelty of that general only served to exasperate the insurgents. Never did opposing parties fight with more courage or fury. Haerlem having surrendered at discretion, the conquerors caused all the magistrates, all the pastors, and above 1500 citizens, to be hanged. The duke of Alba being at length recalled, the grand commander of the Requesnes was sent in his place, and after his death Don John of Austria; but neither of those generals could restore tranquillity in the Lower Countries. To this son of Charles V. succeeded a grandson no less illustrious, namely, Alexander Farnese duke of Parma, the greatest man of his time; but he could neither prevent the independence of the United Provinces, nor the progress of that republic. Philip, always at his ease in Spain, instead of coming to reduce the rebels in Flanders, proscribed the prince of Orange, and set 25,000 crowns upon his head. William, superior to Philip, disdained to make use of that kind of vengeance, and trusted to his sword for his preservation. In the mean time the king of Spain succeeded to the crown of Portugal, to which he had a right by his mother Isabella. This kingdom was subjected to him by the duke of Alba, in three weeks, in 1580. Antony, prior of Crato, being proclaimed king by the populace of Lisbon, had the resolution to come to an engagement; but he was vanquished, pursued, and obliged to fly for his life. A cowardly assassin, Balthazar Gerard, by a pistol-shot killed the prince of Orange, and thereby delivered Philip from his most implacable and dangerous enemy. Philip was charged with this crime without reason; though, when the news was communicated to him, he was imprudent enough to exclaim

this blow had been given two years ago, the Catholic religion and I should have gained a great deal by it.' But this murder did not restore to Philip the Seven United Provinces. That republic, already powerful by sea, assisted England against him. Philip, having resolved to distress Elizabeth, fitted out, in 1588, a fleet of 150 ships, which were partly captured, partly burnt, and partly shipwrecked; and of which very few returned. See ARMADA. This enterprise cost Spain 40,000,000 of ducats, 20,000 men, and 100 ships. While Philip attacked England, he was encouraging in France the Holy League; the object of which was to overturn the throne and divide the state. The leaguers conferred upon him the title of protector of their association; which he eagerly accepted, from a persuasion that their exertions would soon conduct him, or one of his family, to the throne of France. But Henry IV. embraced the Catholic religion, and made his rival lose France in a quarter of an hour. Philip, at length, exhausted by the debaucheries of his youth, and the toils of government, drew near his last hour. A slow fever, the most painful gout, and a complication of other disorders, could not disengage him from business, nor draw from him the least complaint. At last, exhausted by a complication of distempers, and being eaten up of lice, he expired the 13th of September, 1598, aged seventy-two, after a reign of forty-three years and eight months. No character was ever drawn by different historians in more opposite colors than that of Philip. From the facts recorded in history, we cannot doubt that he possessed, in an eminent degree, penetration, vigilance, and a capacity for government. He entered into every branch of administration; watched over the conduct of his ministers with unwearied attention; and in his choice both of them and of his generals discovered considerable sagacity. He never appeared to be either elated or depressed. His temper was the most imperious, and his looks and demeanor were haughty and severe; yet, among his Spanish subjects, he was of easy access, listened patiently to their complaints, and, where his bigotry did not interfere, was willing to redress their grievances. It is impossible to suppose that he was insincere in his zeal for religion. But, as his religion was of the most corrupt kind, it served only to increase the depravity of his disposition; and prompted him to commit the most odious and shocking crimes. Of the triumph of honor and humanity over the dictates of superstition, there occurs not a single instance in the whole reign of Philip; who violated the most sacred obligations as often as religion afforded him a pretence, and exercised for many years the most unrelenting cruelty, without reluctance or remorse. His ambition, which was exorbitant; his resentment, which was implacable; his arbitrary temper, which would submit to no control, concurred with his bigoted zeal for the Catholic religion to carry a sanguinary spirit to as great a height in Philip as it ever attained. Though of a small size, he had an agreeable person. His countenance was grave, his air tranquil, and one could not discover from his looks either joy in prosperity or chagrin in adversity. The wars against Holland, France, and England, cost Philip 564,000,000 of ducats; but America furnished him with more than the half of that sum. His revenues, after the junction of Portugal, are said to have amounted to 25,000,000 of ducats, of which he only laid out 100,000 for the support of his own household. Few princes have been more dreaded, or more abhorred. He had successively, if not all at once, war to maintain against Turkey, France, England, Holland, and almost all the Protestants of the empire, without a single ally. Notwithstanding so many millions employed against the enemies of Spain, Philip found in his economy and his resources wherewith to build thirty citadels, sixty-four fortified places, nine seaports, twenty-five arsenals, and as many palaces, without including the escurial. His debts amounted to 140,000,000 of ducats, of which, after having paid 7,000,000 of interest, the greatest part was due to the Genoese. He had sold or alienated a capital stock of 100,000,000 of ducats in Italy. He affected to be more than commonly devout; he ate often at the refectory with the monks; never entered their churches without kissing all the relics; caused his bread to be kneaded with the water of a fountain which was thought to possess a miraculous virtue; and boasted of never having danced. One great event of his domestic life is the death of his son Don Carlos. The manner of this prince's death is not known. His body, which lies in the monument of the escurial, is separated from his head. All that we know of the matter is, that in 1568, his father having discovered, or pretending to have discovered, that he had some correspondence with the Hollanders, his enemies, arrested him himself. He wrote at the same time to pope Pius V. an account of his son's imprisonment; and in his letter to this pontiff, the 20th of January, 1568, says, 'that from his earliest years, the strength of a wicked nature has stifled in Don Carlos every paternal instruction.' Philip II. caused to be printed at Anvers, between 1569 and 1572, in 8 vols. folio, the fine Polyglot Bible which bears his name; and he subjected the islands afterwards called the Philippines. He married successively, 1. Mary, daughter of John III. king of Portugal; 2. Mary, daughter of Henry VIII., queen of England; 3. Elizabeth of France, daughter of Henry II.; 4. Anne, daughter of the emperor Maximilian II. Don Carlos was the son of his first wife.

PHILIP, an island in Lake Superior, belonging to the United States. It lies towards the south side of the lake, and south-east of Isle Royal.

PHILIP, FORT ST., a lately celebrated fortress of the island of Minorca, at the entrance of Port Mahon. The works were levelled by the Spaniards in 1805, but the houses still form a neat town.

PHILIP (ST.), a village of Mexico, on the Rio del Norte, celebrated for a bridge of eight arches, curiously constructed. The pillars are made of neat wood work, something similar to a crate, and in the form of a keel boat, the sharp end to the current. This crate is filled with stone, in which the river has lodged sand, clay, &c., until

it has become of a tolerably firm consistence. On the top of the pillars are pine logs laid lengthways, squared on two sides and joined pretty close; the whole makes a tolerable bridge for horses.

PHILIP ISLANDS, two islands in the South Pacific Ocean, discovered by captain Hunter in 1791, on his return from New South Wales. They are nearly joined together by a long sandy spit above water. Round the largest island is a sand-bank above water, which extends above half a mile into the sea. These islands are dangerous in the night to ships, on account of the sandy spits which abound here, and the land is low and barren. Long. 140° 3′ E., lat. 8° 6′ S.

PHILIP ISLAND, an island in the South Pacific Ocean, about six miles south of Norfolk Island. Also another in the South Pacific, discovered by captain Turnbull, and so named in honor of Sir Richard Philips. It is in long. 143° 57′ W., lat. 16° 24′ S. There are also two islands of this name in the south and east coast of New Holland.

PHILIPPEAU, or PHILYPEAUX (John Frederick), count of Maurepas, a French statesman, born in 1701, and in 1715, at the age of only fourteen, appointed secretary at court. In 1728 he became superintendant of the marine, and in 1738 minister of state; but in 1749 he was banished to Bourges, by the intrigues of a lady at court. In 1774 he was recalled to the ministry by Louis XVI., who placed great confidence in him. He was a man of profound learning, and great liberality; but has been blamed by the friends of the unfortunate house of Bourbon, for the advice he gave the king, to assist the American republicans to throw off their dependence on Great Britain. He did not live to see the consequences, as he died in 1781.

PHILIPPEVILLE, a town of France, in the department of the Ardennes, anciently called Corbigny, till Mary of Austria fortified it in 1577, and named it Philippeville, in honor of Philip II. of Spain. Its fortifications were renewed by Louis XIV. It is thirty-six miles north of Charleville.

PHILIPPI, in ancient geography, a town of Macedonia, in the territory of the Edones, on the confines of Thrace, situated on the side of a steep eminence; anciently called Datum and Drenides (Appian), though Strabo seems to distinguish them. This town was famous on several accounts; not only as taking its name from the celebrated Philip II. of Macedon, who considered it as a fit place for carrying on the war against the Thracians; but also on account of two battles fought in its neighbourhood between Augustus and the republican party. In the first of these battles Brutus and Cassius had the command of the republican army; while Octavianus, afterwards Augustus, and Marc Antony, had the command of their adversaries. The army of Brutus and Cassius consisted of nineteen legions and 20,000 horse; the imperial forces of an equal number of legions, but more complete, and 13,000 horse; so that the numbers on both sides were pretty equal. The troops of Brutus were richly dressed, most of them having their armour adorned with gold and silver; for Brutus, though very frugal in other respects, was thus extravagant with respect to his men, thinking that the riches that they had about them would make them exert themselves the more, to prevent these from falling into the enemy's hands. Both the republican generals appear to have been inferior in skill to Marc Antony; for as to Octavianus, he is allowed never to have conquered but by the valor of others. A little before the first engagement, Octavianus, who had been indisposed, was carried out of the camp at the persuasion of Artorius, his physician, who had dreamed that he saw a vision directing him to be removed. Brutus's men, who opposed the wing commanded by Octavianus, charged without order, which caused great confusion. However, they were successful; for part of them, taking a compass about, fell upon the enemy's rear: after which they took and plundered the camp, making a great slaughter of such as were in it, and among the rest putting 2000 Lacedemonians to the sword, who had newly come to the assistance of Octavianus. The emperor himself was sought for, but in vain, having been conveyed away for the reasons above-mentioned; and, as the soldiers pierced the litter in which he was usually carried, it was thence reported that he had been killed. This threw that whole part of the army into such consternation, that, when Brutus attacked them in front, they were most completely routed; three whole legions being cut in pieces, and a prodigious slaughter made among the fugitives. But, by the imprudence of the general in pursuing too far, the wing of the republican army commanded by Cassius was left naked and separated from the rest of the army; on which they were attacked at once in front and in flank, and thus they were defeated, and their camp taken, while Brutus imagined that he had gained a complete victory. Cassius himself retired to an eminence at a small distance from Philippi; whence he sent one of his greatest intimates to procure intelligence concerning the fate of Brutus. That general was on his way, and already in view, when the messenger set out. He soon met his friends; but they surrounding him to enquire the news, Cassius, who beheld what passed, imagined that he was taken prisoner by the enemy, retired to his tent, and in despair caused one of his freed men to cut off his head. Or at least thus far is certain, that he went into the tent with a freed man, and that his head was found separated from his body when Brutus entered. The man, we are told, was never afterwards seen. The second engagement was pretty similar to the first. Brutus again opposed Octavianus, and met with the same success; but in the mean time Antony, to whom he ought undoubtedly to have opposed himself, having to do only with the lieutenants of Cassius, gained a complete victory over them. What was worst, the fugitives, instead of leaving the field of battle altogether, fled for protection to Brutus's army; where, crowding in among the ranks, they carried despair and confusion wherever they went, so that a total defeat ensued, and the republican army was almost entirely cut in pieces. After the battle, Brutus put an end to his own life. See ROME. The city of Philippi is likewise remarka-

pie on account of an epistle written by St. Paul to the church in that place. It was a Roman colony. Luke, Pliny, Coin, Inscription. It is also remarkable for being the birth-place of Adrastus, the peripatetic philosopher, and disciple of Aristotle. The town is still in being, but greatly decayed. However, there is an old amphitheatre, and several other monuments of its ancient grandeur.

PHILIPPIANS, Epistle of Paul to the, a canonical epistle of the New Testament, is generally agreed to have been written by St. Paul in the second year of his imprisonment at Rome, about A. D. 62. The Christian church was first planted at Philippi about the year of our Lord 51, by St. Paul; who, having made a progress through Galatia and Phrygia (Acts xvi.) and intending to pursue his tour through Bithynia, was admonished by the Spirit to go over to Macedonia. Being arrived at Philippi, he, with Timothy, Luke, and Silas, spent some days there in preaching the gospel. Though the apostle soon after left the city, Luke and Timothy continued there some time longer to carry on the work; and this was one reason why he fixed on the latter to visit the Philippians in his absence. Philip ii. 19—22. It appears from Acts xx. 6, that St. Paul made the Philippians a second visit.

This epistle, which is quite of the practical kind, seems to be designed to comfort the Philippians, under the concern they had expressed at the news of his imprisonment; to check a party spirit, that appears to have broken out among them, and to promote on the contrary an entire union and harmony of affection; to guard them against being seduced from the purity of the Christian faith by Judaizing teachers; to support them under the trials with which they struggled; and, above all, to inspire them with a concern to adorn their profession by the most exalted attainments in the divine life.

PHILIPPIC, from the invectives of Demosthenes against Philip of Macedon. Any invective declamation.

PHILIPPICS, Gr. Φιλιππικοι λογοι, in literature, a name which is given to the orations of Demosthenes against Philip II., king of Macedon. The philippics are reckoned the master pieces of that great orator: Longinus quotes many instances of the sublime in them; and points out a thousand latent beauties. Indeed that pathetic eloquence in which Demosthenes excelled, the frequent interrogations and apostrophes wherewith he attacked the indolence of the Athenians, could be no where better employed. Whatever delicacy be in the oration against Leptines, the philippics have the advantage over it, were it only on account of the subject, which gives Demosthenes so fair a field to display his chief talent, that of moving and astonishing. Dionysius Halicarnasseus ranks the oration on the Halonese among the philippics, and places it the eighth in order: but though his authority be great, yet that force and majesty wherein Cicero characterises the philippics of Demosthenes, seem to exclude the oration on the Halonese: and authorise the almost universal opinion of the learned, who reject it as spurious. Libanius, Photius, and others, but above all the languidness of the style, and the lowness of the expressions, which reign throughout the whole, seem to assign it to Hegesippus.

Philippics is a term likewise applied to the fourteen orations of Cicero against Marc Antony. Cicero himself gave them this title in his epistles to Brutus; and posterity have found it so just, that it has been continued. Juvenal, Sat. x. calls the second the divine philippic, and styles it Conspicuæ divina Philippica famæ. That orator's entitling his last and most valued orations after the philippics of Demosthenes shows the high opinion he had of them. Cicero's philippics cost him his life; Marc Antony having been so irritated with them, that when he arrived at the triumvirate, he procured Cicero's murder, cut off his head, and stuck it up in the very place whence the orator had delivered them.

The PHILIPPINE Islands, the best defined division of the Malay Archipelago, extending between the latitudes 5° and 20° N., or from Borneo nearly to Formosa: their number has been estimated at above 10,000, but 500 or 600 only are of any consequence; the remainder being merely rocks, and many not half a mile in circuit. The largest of the group is Luçon, or Luconia; to the south of which the principal islands are Mindoro, Panay, Marindique, Negros, Masbate, Zebu, Bohol, Leyte, Samar, and Magindanao: the aggregate of the whole being denominated Bisayas; also Islas de Pintados, or Painted Islands, the inhabitants having been accustomed to paint their bodies before the arrival of the Spaniards. All these islands are nominally subordinate to the Spanish government at Manilla, and some of them partially colonised, paying a tribute, collected by the corregidores, or alcaides mayores, of the provinces into which they are subdivided. Into other places, however, the Spaniards have never been able to penetrate; and the inhabitants, having escaped from their yoke into the fastnesses and inaccessible parts, wage an inveterate war against them.

These islands offer a terribly magnificent spectacle. The mountains which cross them in every direction lose their heads in the clouds, while their sides are covered with basaltes, lava, scoriæ, and other volcanic matter, and in many places are seen boiling springs and wells of liquid burning sulphur. All these appearances and phenomena are the work of extinct volcanoes, of those still in ignition, or of fires concealed in the bowels of the earth, which produce frequent and terrible earthquakes. The surface of the islands is almost universally furrowed by innumerable ravines, and has many large tracts of marsh and turf and some considerable lakes.

The same variety of seasons is found here as on the coasts of Hindostan, and proceeds from a similar cause, the chain of mountains that run through the Archipelago from north to south. During the monsoon from May to September, the rain is continual on the west coasts, and all the plains are transformed into lakes. Violent storms are also experienced at this season; while towards the north and east the winter is serene and dry. The north-east monsoon in October, however, brings similar rains and storms on these

coasts. This constant humidity of the atmosphere renders these islands supereminently fertile, and preserves a perpetual verdure, not only in the trees, but on the meadows, which produce a luxuriant herbage, and are throughout the year enamelled with flowers of the most beautiful tints.

The Philippine Islands are capable of producing all colonial commodities; and their situation is most advantageous for the commerce of India, China, and America. Rice is their chief production, and the best food of the natives, who appear to have cultivated it in large quantities before the arrival of the Spaniards. The other products are different sorts of pulse, such as mongos, patani, kidney beans, and millet. The pith of the palm, the young shoots of the sugar cane, green withes, and other succulents, serve also as food, and the natives cultivate the bread fruit, beans, the cacavata, &c. They take particular care of the palm tree, as from it they procure both a spirit and an oil, together with a species of sweetmeat, named by them chanaca. The fruit trees are few in number, and of an indifferent quality, except the plantain, to which may be added the orange and mango. The areca, or betel nut, is also cultivated, and used profusely under the name of itmo. Manilla likewise produces indigo. Cotton is also raised for clothing; and dyed with indigo, log-wood, and the seed of the achiste tree. Wax, wild honey, amber, marble, tar, brimstone, and many other lesser objects, may also be named among the commercial produce.

In the interior there are mines of gold and iron, but they are little attended to; gold is also procured by washing the sand which flows in the small streams from the mountains. At Paracale the gold mines are worked, but very indolently, and scarcely so as to defray the charges. In the mountains there is excellent timber both for ship and house building, and the bamboos are very long and thick. Of these the natives construct their houses, covering them with palm leaves.

The Spaniards introduced here horses and horned cattle, which have multiplied so as to run wild among the mountains. They also introduced sheep, geese, grapes, figs, wheat, pepper, coffee, cocoa, sugar, tobacco, and various European plants, which have thriven remarkably well. Among the birds found here are the swallows, which form the edible nests so highly esteemed by the Chinese; the biche de mar, another Chinese delicacy, is also procured on the coast. On the shores are a great variety of shells and shell fish: among the rest are cowries and the enormous Kima cockle, some of which will hold a gallon, and are used for vessels of holy water in the churches.

The sloth both of the Indians and the Spaniards are here great obstacles to improvement; add to these the hurricanes which sweep away and destroy the plantations, and the destruction caused by insects, rats, and other vermin with which the country teems.

The natives carry on among themselves a barter in which gold is the medium of exchange: they carry on likewise a small trade with the Chinese and Malays of Borneo for flag-stones, copper, and articles of furniture. As to clothing, they go almost naked; their rice they cook in a joint of the bamboo, and eat it off a plantain leaf.

The early Spanish visitors of the Philippines seriously speak of the natives as divided into three classes; satyrs, men with tails, and sea monsters. It is probable they mean the various tribes of Bisayan Indians, and the strange race of oriental negroes, who still occupy the Papuan Isle; the latter roaming the mountains almost in a state of nature, and subsisting on roots and such animals as they could kill with the bow and arrow. The Spaniards are of opinion that these are the original inhabitants of the Philippines, and that the Bisayans were intruders. At present the Papuas are few, and their power limited; but their hatred to the Bisayans flourishes in such perfection, that, when the latter kill a negro, it is customary for another to bind himself to his countrymen by oath that he will disappear, and will not return among them until he has killed three or four Bisayans. The Tagala tribe is principally found in the Island of Luçon; but there are several other races who inhabit these islands, who differ considerably in features and language. Such are the Pampangos, who reside to the north of Manilla, and the painted races.

Among the Bisayans, the rajah, or chief, with the assistance of elders, regulates civil affairs; but in criminal cases the relations are accustomed to compound with the aggressor in gold, unless in cases of murder, when the law of retaliation is sanctioned. If the perpetrator happen to be of a different village or tribe, all the community of which the deceased was a member make it a common cause, and numbers are, in consequence, killed and made slaves on both sides. A person suspected of theft is obliged to undergo the ordeal of drawing a stone from the bottom of a cauldron of boiling water, and if he fails is fined a certain quantity of gold. Adultery is also punished by a mulct. Polygamy is not allowed; but concubines are freely kept by the principal persons.

Among certain tribes the bridegroom purchases his bride by a previous service of several years. During this probation it is incumbent on all the relations of the suitor to behave respectfully to the bride and her family, as if any insult be offered the marriage is annulled, and the female is to be disposed of a second time. The bridegroom, to console himself for his sufferings, as soon as his term of service ends, treats his wife as a slave. The marriage ceremony is performed by the immolation of a hog, which is slain by a priestess with much grimace.

Of the Ta-gala, or Gala language, there are six dialects in the island of Luçon, and two in Atton. Some of these are current in several islands, but the most general are the Tagala and Bisaya; the last of which is very barbarous, but the other more refined and polished. The alphabet consists of seventeen letters; three of these being vowels and fourteen consonants. The Tagala characters are used in Comintan, and in general among the Tagalas, who have embraced

Christianity. The idioms of this language are very complex, and it often becomes quite impossible for a person who understands all the words of a sentence to comprehend the meaning of the whole. The religious traditions of the Tagala race, their genealogies, and the feats of their gods and heroes, are carefully preserved in historical poems and songs.

In their religious ceremonies the Bisayans use neither idols nor temples, their sacrifices being offered in arbours, which they raise for that purpose; nor have they any external address to their gods. They have priestesses, whom they term babailonas or catalonas: and the sacrifices are offered alike to evil spirits and to the manes of their ancestors. They have many superstitions, one of which is respecting the Patianac, a spirit or ideal being, whose employment they state consists in preventing, by a method peculiar to itself, the delivery of a woman in labor. To counteract the malignity of this demon, the husband, having made fast the door, strips off his clothes, lights a fire, and, arming himself with a sword, flourishes it furiously about until the woman is delivered. The Tigbalang is another object of their apprehension, and is described as a phantom which assumes a variety of uncouth shapes, and interposes its authority to prevent the converted Indians from performing the duties of religion. They do not believe in any future state of reward or punishment; but they acknowledge the immortality of the soul, and suppose it to retain in the next world all the wants incident to that on earth. For this reason they place on the tomb clothes, arms, and food; and, on the fourth day, when the funeral ceremony is performed, a vacant seat is left at the table for the deceased, whom they believe to be present, although not perceptible.

These islands were discovered by Magellan in 1521; but it was not till the year 1565 that they were taken possession of by a fleet from Mexico, which first anchored off the island of Zebu, and subdued it. In 1570 a settlement was effected at the mouth of the Manilla River, and in the following year the town of that name constituted the capital of the Spanish possessions here. In 1574 the colony was attacked by a fleet of Chinese pirates, who were with difficulty repulsed.

The Spaniards in 1590 attacked the island of Sooloo or Jolo, but were in their turn repulsed with great slaughter; nor could they make any impression on the Sooloo pirates, who have for nearly three centuries been the scourge of the Philippines. The Dutch having established themselves in India, a war commenced in this neighbourhood between them and the Spaniards, which lasted nearly half a century. By A. D. 1639 the number of Chinese on these islands had increased to 30,000. In 1639 the Spaniards commenced a war against them, and made so dreadful a havock, that in a short time they were reduced to 7000, who surrendered at discretion. During this period the native Indians remained neuter, having a greater hatred to the Chinese than to the Spaniards.

In 1757 the viceroy of the Philippines expelled all the Chinese; and, in order to prevent their future establishment in the archipelago, appropriated the quarter of St. Fernando for the reception of such as should come in future on commercial pursuits.

In 1762 Manilla was taken by the English. They arrived in the bay 23rd of September, and found the Spaniards quite unprepared to receive them. On the morning of the 24th a summons was sent to the town; the troops and stores were then landed, and the city invested. On the 4th of October the batteries were opened, and the following day a practicable breach was effected. on the 6th, at day-light, the storming party mounted the breach, and the governor and principal officers were glad to surrender at discretion. At the peace in 1764 it was, however, relinquished.

Since this period the Spanish colonies in these islands have not been disturbed by European enemies, although frequently threatened with invasion from the British settlements. Besides Manilla, and the larger establishments on Luçon, they have many settlements scattered over the islands to the south, but such is the weakness of the colonial government that they have never been able to protect them against the attacks of a few despicable pirates. In February, 1809, the Spanish government of the Philippines published a declaration of their adherence to Ferdinand VII. and opened their ports to the British; after which a brisk trade arose which has been considerably injured by the revolutionary warfare in Mexico.

All kinds of India piece goods may be imported here with advantage, especially ordinary long cloth, white, blue, and red; handkerchiefs of all kinds; chintz, principally dark grounds; Surat goods of most sorts, and all kinds of cutlery and iron. The exports are birds' nests, cassia, gold dust, pepper, rattans, sago, tortoise shell, wax, wild honey, amber, marble, tar, brimstone, and many inferior articles. From 1802 to 1806 there were imported into Manilla, from the British settlements in India, goods and treasure to the amount of 2,859,822 rupees, equal to about £286,000; the exports during the same period amounted to 5,163,564, equal to about £516,356. Junks also come to these islands from China, bringing various articles for the consumption of the resident Chinese, silk goods, lackered ware, teas, China ware, &c., for the Acapulco ships. Their returns are principally in dollars, cochineal, or black wood.

Philippines, a religious society of young women at Rome, so called from their taking St. Philip de Neri for their protector. It consists of 100 poor girls, who are brought up till they are of age to be married, or become nuns, under the direction of religious women. They wear a white veil, and black cross.

PHILIPPISTS, a temporary sect among the Lutherans; the followers of Melancthon. He had strenuously opposed the Ubiquists, who arose in his time; and, the dispute growing still hotter after his death, the university of Wittemberg, who espoused Melancthon's opinion, were called by the Flacians, who attacked it, Philippists.

PHILIPPOPOLI, or Filibe, a considerable

town of Greece, in Macedon, situated on a small island formed by the Marizza, which is here navigable. It was founded by Philip, the father of Alexander the Great; and, before the earthquake which took place here in 1818, was a thriving place, containing 30,000 inhabitants, a considerable number of whom were Greek Christians, and had an archbishop. It had several handsome baths and mosques, but the above calamity greatly reduced the place. The chief existing manufactures are woollens and cotton yarn; rice is also largely cultivated in the neighbourhood. Ninety-five miles W. N. W. of Adrianople, and 225 W. N. W. of Constantinople.

PHILIPPON DE LA MADELEINE (Louis), born at Lyons in 1734, studied the law at Besançon, where he settled, and filled several public offices. In 1795 he was created librarian of the ministry of the interior, and on the Restoration, in 1814, received a pension from monsieur, now Charles X. He died in 1818, having published the following works:—Jeux d'un Enfant du Vaudeville; Choix de Chansons de M. Philippon de la Madeleine; L'Elève d'Epicure; Discours sur la Necessité et les Moyens de supprimer les Peines Capitales; Manuel et nouveaux Guide du promeneur aux Tuilleries; Grammaire des Gens du Monde; Dictionnaire portatif des Poetes Françaises morts depuis 1050, jusqu'en 1804, preceded by an abridged history of French poetry; Dictionnaire portatif des Rimes; Voyages de Cyrus, par Ramsay; Morceaux choisis des Caractéres de la Bruyere, with a notice on the author. Philippon also wrote several comedies, in conjunction with MM. Leger, Therigny, viscount Segur, and the prevost d'Iray.

PHILIPS (Ambrose), an English poet, descended from a very ancient family in Leicestershire, was educated at St. John's College, Cambridge, where he wrote his pastorals, which acquired him at the time so high a repuation. His next performance was the Life of Archbishop Williams, written, according to Cibber, to make known his political principles, the archbishop, who is the hero of his work, being a strong opponent to the high church measures. When he quitted the university, and came to London, he became a constant attendant at Button's coffeehouse, where he became intimate with the most celebrated geniuses of that age, particularly with Sir Richard Steele, who, in the first volume of his Tatler, inserted a poem of Mr. Philips's, called a Winter Piece, dated from Copenhagen, on which he bestows the highest encomiums; and, indeed, so much justice is in these his commendations, that even Pope himself, who had a fixed aversion for the author, while he affected to despise his other works, used always to except this. He wrote several dramatical pieces: The Briton; Distressed Mother; and Humphrey Duke of Gloucester, all of which met with success, and one of them is still a standard of entertainment at the theatres, being generally repeated several times every season. Mr. Philips's circumstances were in general, not only easy, but affluent, from his being connected, by his political principles, with persons of great consequence. He was concerned with Dr. Hugh Boulter, afterwards archbishop of Armagh, the right honorable Richard West, esq., lord chancellor of Ireland, bishop Burnet, and the Rev. Henry Stephens, in *writing a series of papers called the Free Thinker* which were all published together by Mr. Philips, in 3 vols. 12mo. In the end of queen Anne's reign he was secretary to the Hanover club, a set of noblemen and gentlemen who had formed an association in honor of that succession, and for the support of its interests. Mr. Philips's station in this club, with the zeal shown in his writings, recommended him to the favor of the new government. He was, soon after the accession of king George I., put into the commission of the peace, and appointed a commissioner of the lottery. And, on Dr. Boulter's being made primate of Ireland, he accompanied that prelate across St. George's Channel, where he got considerable preferments, and was elected a member of the house of commons for Armagh. At length, having purchased an annuity for life of £400 per annum, he came over to England some time in 1748, but died soon after, at his lodgings near Vauxhall in Surrey. 'Of his personal character,' says Dr. Johnson, 'all I have heard is, that he was eminent for bravery, and skill in the sword, and that in conversation he was solemn and pompous.'

PHILIPS (Catharine), an ingenious lady, daughter of Mr. John Fowler, merchant, born at London in January, 1631, and educated at Hackney. She married James Philips of the priory of Cardigan, esq., and went with the viscountess of Dungannon into Ireland, where she translated Corneille's tragedy of Pompey into English, which was several times acted there with great applause. She translated also the four first acts of Horace, another tragedy of Corneille, the fifth being done by Sir John Denham. This lady died of the small-pox in London, 22d June, 1664, much and justly regretted; 'having not left,' says Langbaine, 'any of her sex her equal in poetry.'

PHILIPS (Fabian), author of several books relating to the ancient customs and privileges in England, was born at Prestbury in Gloucestershire, September 28th, 1601. He studied in the inns of Chancery, and the Middle Temple, where he became learned in the law. In the civil wars he was a bold assertor of the king's prerogative; and, two days before Charles I. was beheaded, he wrote a protestation against the intended murder, and caused it to be printed, and affixed to posts in all public places. He likewise published in 1649, 4to., a pamphlet entitled Veritas Inconcussa; or King Charles I. no Man of Blood, but a Martyr for his People; which was reprinted in 1660, 8vo. In 1653, when the courts of justice at Westminster, especially the Chancery, were voted down by Oliver's parliament, he published Considerations against the dissolving and taking them away; for which he received the thanks of William Lenthal, esq., speaker of parliament. He was for some time filazer for London, Middlesex, Cambridgeshire, and Huntingdonshire; and spent much money in searching records, and writing in favor of the royal prerogative. The only reward he received was the place of one of the commissioners for regulating the law, worth £200 per annum, which lasted two years. After

the Restoration, when the bill for taking away the tenures was depending in parliament, he wrote and published a book to show the necessity of preserving them, entitled Tenenda non tollenda; or the Necessity of preserving Tenures in capite, and by Knight's-service, which were a great part of the salus populi, &c., 1660, 4to. In 1663 he published The Antiquity, Legality, Reason, Duty, and Necessity of Preemption and Pourveyance for the King, 4to.; and afterwards many other pieces upon similar subjects. He assisted Dr. Bates in his Elenchus Motuum. He died November 17th, 1690, in his eighty-ninth year, and was buried at Twyford in Middlesex. His manner of writing is neither close nor well digested. He published a political pamphlet in 1681, entitled Ursa Major et Minor, showing that there is no such Fear, as is factiously pretended, of Popery, and arbitrary Power.

PHILIPS (John), an eminent English poet, was born in 1676. He was educated at Winchester and Oxford. The first poem which distinguished him was his Splendid Shilling, published in 1705. His next was Blenheim. In 1706 he finished another poem upon Cyder. He also wrote a Latin ode to Henry St. John, esq., which is esteemed a masterpiece. He was contriving greater things; but, his health failing, he was obliged to drop every thing but the care of it. This care, however, did not save him; for, after lingering a long time, he died at Hereford, February 15th, 1708, of a consumption and asthma, before he had reached his thirty-third year. He was interred in the cathedral of that city, and had a monument erected to his memory in Westminster Abbey, by Sir Simon Harcourt, afterwards lord chancellor, with an epitaph written by Dr. Atterbury.

PHILIPS (Thomas), a learned English Catholic, born at Ickford in Buckinghamshire, in 1708, and educated at Louvain. He was afterwards sent over as a missionary to England, where he published a Letter to a Student in Divinity, and other tracts. But the work for which he is most celebrated is his Life of Cardinal Pole, in 2 vols. 8vo., wherein he endeavoured to soften the harsh features of popery, and to wash his church from her stains of blood and tyranny. Several English divines published answers to this work, particularly Dr. Neve, Dr. Gloster Ridley, &c. Philips died at Liege in 1774.

PHILIPSBURG, a town of Baden, about half a mile from the Rhine. It was long fortified, and one of the strongest places in Germany; but was at last allowed to go to decay, and in the wars of the French revolution completely dismantled. Its situation is in the midst of marshes, which make it unhealthy. The celebrated duke of Berwick, son of James II. of England, was killed by a cannon ball, while visiting the trenches before this place, 12th June, 1734. Population 1100. Five miles south of Spire, and fourteen north of Carlsruhe.

PHILIPSBURGH, a rising settlement of Lower Canada, on the eastern coast of Missiqui Bay, about one mile from the boundary line between Lower Canada and the territories of the United States. It is a neat place, but chiefly built of wood.

PHILISTÆA, in ancient geography, the country of the Philistines: which lay along the Mediterranean, from Joppa to the boundary of Egypt, and extending to inland places not far from the coast. It is also called Palestina (Josephus), a name afterwards applied to the whole of the Holy Land. See PALESTINA.

PHILISTÆI, or PHILISTIM, the people of Philistæa, called also Caphtorim and Philistini, originally from Egypt, and descendants of Ham. Moses. They expelled and destroyed the Hivites the ancient inhabitants, and occupied their country; that is, the regions which retained the name of Philistim, in which that of Caphtorim was swallowed up.

PHILISTINES, PHILISTINI, the ancient inhabitants of Palestine, well known in sacred history. The people are sometimes called in Scripture Cherethites and Caphtorims. The earlier part of their history is, like that of most other nations, very obscure and uncertain. The authors of the Universal History tell us that they were descended partly from the Casluhim, and partly from the Caphtorim, both from Mizraim, the son of Ham, the son of Noah. Moses tells us (Deut. xi. 23) that they drove out the Avim, or Avites, even to Azzah, or Gazah, where they settled; but when this happened cannot be determined. But our learned authors are clearly of opinion that the Casluhim and Caphtorim, from whom the Philistines are descended, came originally from Egypt, and called the country which they had conquered by their own name. See PALESTINE. Many interpreters, however, think that Caphtor was but another name for Cappadocia, which they imagine to have been the original country of the Philistines. But father Calmet, in a particular dissertation prefixed to the first book of Samuel, endeavours to show that they were originally of the Isle of Crete. The reasons which led him to think that Caphtor is the Isle of Crete are as follow:—The Philistines were strangers in Palestine, as appears in various parts of Scripture, such as Gen. x. 14; Deut. ii. 23; Jer. xlvii. 4; and Amos ix. 7, whence the Septuagint always translate this name strangers. Their proper name was Cherethims. See Ezekiel xxv. 16; Zephaniah ii. 5; and 1 Samuel xxx. 14. The kings of Judah had foreign guards, called the Cherethites and Pelethites, who were of the number of the Philistines. 2 Sam. xv. 18. The Septuagint, under the name Cherethites, understood the Cretans; and by Chereth they understood Crete. Besides, the Scripture says that the Philistines came from the Isle of Caphtor. Now we see no island in the Mediterranean, wherein the marks whereby the Scripture describes Caphtor and Cherethim, agree better than in the Isle of Crete. The name Cretim or Cherethim is the same with that of Cretenses. The Cretans are one of the most ancient and celebrated people who inhabited the islands of the Mediterranean. They pretended to have been produced originally out of their own soil. This island was well peopled in the time of the Trojan war. Homer calls it the island with 100 cities. The city of Gaza in Palestine went by the name of Minoa (Steph. Byzant. in Gaza) because Minos, king of Crete,

coming into that country, called this ancient city by his own name. Herodotus acknowledges that the Cretans were originally all barbarians, and did not come from Greece. Homer says that a different language was spoken in the Isle of Crete; that there were Greeks there, true, or ancient Cretans, Pelasgians, &c. The ancient Cretans are the same as the Cherethites, the Pelasgians as the Philistines or Pelethites of the Scripture: their language was the same with that of the Canaanites or Phœnicians, that is, Hebrew: they were descended, as well as Canaan, from Ham, by Mizraim (Gen. x. 6, 13, 14). The manners, arms, religion, and gods of the Cretans and Philistines were the same. The arms of both were bows and arrows. Dagon, the god of the Philistines, was the same as the Dictynna of the Cretans. But Mr. Wells does not think these arguments convincing. He is of the same opinion with the authors of the Universal History, who say that Coptus, the name of an old city of Egypt, is a corruption of the ancient Caphtor. But whether they came from Crete, from Cappadocia, or from Egypt, they had certainly been a considerable time in the land of Canaan when Abraham arrived there, in the year of the world 2083. They were then a very powerful people, were governed by kings, and in possession of several considerable cities. Several of their kings then in power were named Abimelech. This race, however, was but of short duration, for their monarchy was changed to an aristocracy of five lords, who were partly independent of each other, though they acted in concert for the common cause. This form of government was again succeeded by another race of kings, among whom the prevailing names were Achish and Abimelech. They were not comprehended in the number of nations devoted to extermination, and whose territory the Lord had promised to the Hebrews; nor were they of the cursed seed of Canaan. However, Joshua gave their lands to the Hebrews. Josh. xv. 45, 47; and xiii. 2, 3. But these conquests of Joshua must have been ill maintained, since under the Judges, under Saul, and at the beginning of the reign of David, the Philistines oppressed the Israelites. Shamgar, Samson, Samuel, and Saul, indeed made head against them, but did not reduce their power; and they continued independent down to the reign of David, who conquered them. They continued in subjection to the kings of Judah down to the reign of Jehoram, son of Jehoshaphat, that is, for about 246 years. However, Jehoram made war against them, and probably reduced them to his obedience again; as they revolted again from Uzziah, who kept them in subjection during his reign. 2 Chr. xxi. 16, and xxvi. 6, 7. During the unfortunate reign of Ahaz, the Philistines made great havock in the territories of Judah; but his son Hezekiah subdued them. 2 Chr. xxviii. 18, and 2 Kings xviii. 8. Lastly, they regained their full liberty under the later kings of Judah; and we find from the vengeance denounced against them by the prophets Isaiah, Amos, Zephaniah, Jeremiah, and Ezekiel, that they brought many hardships and calamities upon the children of Israel: for which cruelties God threatened to punish them. Esarhaddon besieged Ashdod, and took it. Isa. xx. 1. And according to Herodotus, Psammeticus, king of Egypt, took the same city, after a siege of twenty-nine years. There is great probability that Nebuchadnezzar, when he subdued the Ammonites, Moabites, Egyptians, and other nations, bordering upon the Jews, reduced also the Philistines. After this they fell under the dominion of the Persians; then under that of Alexander the Great, who destroyed Gaza, the only city of Phœnicia that durst oppose him. After the persecution of Antiochus Epiphanes, the Asmonæans subjected under their obedience several cities of the Philistines; and Tryphon gave to Jonathan Maccabæus the government of the whole coast of the Mediterranean, from Tyre as far as Egypt, which included all the country of the Philistines.

PHILISTIS, an ancient queen, whose coin is still extant, but of whose life, reign, country, and government, nothing is recorded, or can now be ascertained. Her coin is also mentioned by Herodotus, which shows that she must have flourished before the time of that ancient historian, but nothing else is recorded by him respecting her. Mr. Pinkerton thinks she reigned in Sicily, and as a confirmation of this conjecture mentions some inscriptions of ΒΑΣΙΛΙΣΣΑΣ ΦΙΛΙΣΤΙΔΟΣ on the Grædini of the theatre at Syracuse; but which do not appear to be older than the times of the Romans. Some authors think she reigned in Malta or Cossara, but Mr. Pinkerton does not think this probable.

PHILISTUS, an ancient historian, born in Syracuse. He enjoyed the friendship of Dionysius; but, being afterwards exiled, he wrote a History of Sicily, in twelve books, which was much admired. He was afterwards recalled, and sent against the Syracusans by Dionysius the younger, but, being defeated, killed himself, A.A.C. 356.

PHILLIPSITE, a new mineral accompanying herschelite. Form of the crystals the same as harmotome; but phillipsite contains silica, alumina, potassa, and lime, without any trace of barytes, as is manifest by putting a drop of sulphuric acid into their solutions in the nitric or muriatic. *Annals of Philosophy*, X. 362.

PHILLYREA, mock privet; a genus of the monogynia order and diandria class of plants; natural order forty-fourth, sepiariæ. Each flower contains two males and one female. Some say there are seven species, all shrubby plants, and natives of France or Italy. Others reckon only three species, viz.

1. P. angustifolia, the narrow-leaved phillyrea, or mock privet, a deciduous shrub, native of Spain and Italy. This is of low growth, seldom rising higher than eight or ten feet. The branches are few and slender, but they are beautifully spotted with gray spots. The leaves stand opposite by pairs. They are long and narrow spear-shaped, and undivided, of a deep green color, and of a thick consistence. The edges are entire, and they stand on short foot-stalks. The flowers make no show. They are whitish, and grow in clusters from the wings of the branches, in March, and are succeeded by small round black berries. The varieties of this species

are, the rosemary phillyrea, lavender phillyrea, striped phillyrea, &c.

2. P. latifolia, the broad leaved phyllyrea, or mock privet, a tall evergreen shrub, a native of the south of Europe. It will grow to about twelve feet high. The branches are strong and upright. The bark is of a gray color, spotted with white, which has a pretty effect; and the leaves grow opposite by pairs. They are of a heart-shaped oval figure, of a thick consistence, and a strong dark green color. Their edges are sharply serrated, and they stand on short strong foot-stalks. The flowers grow from the wings of the leaves in clusters, in March. They are of a kind of greenish-white color, make no show, and are succeeded by small round black berries. There are three varieties, viz. the ilex-leaved phillyrea, the prickly phillyrea, and the olive phillyrea with slightly serrated edges.

3. P. media, the oval-leaved phillyrea, or mock privet, or the medial-leaved phillyrea, a tall evergreen shrub, native of the South of Europe. It has also three varieties, viz. 1. the common smooth-leaved phillyrea. This plant grows to twelve or fourteen feet high, and the branches are very numerous. The older branches are covered with a dark brown bark, but the bark on the young shoots is of a fine green color. They are oval, spear-shaped, and grow opposite, by pairs, on strong short foot-stalks. The flowers are produced in clusters from the wings of the young branches. They are small, and of a greenish-white color; they appear in March, and are succeeded by berries, which are first green, then red, and black in autumn when ripe. 2. The privet-leaved phillyrea grows to ten or twelve feet high, and the branches are covered with a brown bark. The leaves a little resemble the privet; they are of a fine green color, and grow by pairs on the branches. They are of a lanceolate figure, and their edges are entire, or nearly so; for some signs of serratures sometimes appear. The flowers grow in clusters in March. They are whitish, and are succeeded by small black berries. 3. The olive-leaved phillyrea is the most beautiful of all the sorts. It will grow to about ten or twelve feet high; and the branches, which are not numerous, spread abroad in a free easy manner, which give the tree a fine air. They are long and slender, covered with a light brown bark; and on these the leaves stand opposite by pairs at proper intervals, on short foot-stalks. They resemble those of the olive-tree, and are of a delightful green. Their surface is exceedingly smooth, their edges are entire, and the membrane of a thickish consistence. The flowers are small and white, and like the other sorts make no show. They are succeeded by single roundish berries. All these species may be either propagated by seeds or layers. 1. By seeds. These ripen in autumn, and should be sown soon after. The mould must be made fine; and, if it is not naturally sandy, if some drift sand be added it will be so much the better. The seeds for the most part remain until the second spring before they come up; and, if they are not sown soon after they are ripe, some will come up even the third spring after. They must be sown about an inch deep; and during the following summer should be kept clean from weeds. After they are come up, the same care must be observed, and also watering in dry weather; and if the beds are hooped, and the plants shaded in the hottest season, so much the better. But at the approach of winter they must be hooped, and the beds covered with mats in the hardest frosts, otherwise there will be danger of losing the whole crop; for these trees, though they are very hardy when grown tolerably large, are rather tender whilst seedlings. They should remain in the seed beds with this management for two summers; and then waiting for the first autumnal rains in September or October (and having prepared a spot of ground), they should at that juncture be planted out, on which they will immediately strike root. The distance from each other need not be more than a foot, if they are not designed to remain long in the nursery. If there is a probability of their not being wanted for some years, they should be allowed nearly double that distance; and every winter the ground in the rows should be well dug, to break their roots, and cause them to put out fresh fibres, otherwise they will be in danger of being lost when brought into the shrubbery quarters. 2. By layers they will easily grow. The autumn is the best time for this operation, and the young shoots are fit for the purpose. The best way of layering them is by making a slit at the joint; though they will often grow well by a twist being only made. When the gardener chooses the method of twisting a young branch for the layers, he must be careful to twist it about a joint so as only to break the bark; for, if it be too much twisted it will die. But, if it be gently twisted, it will, at the twisted parts, strike root, and by autumn following, as well as those layers that had been slit, will have good root; the strongest of which will be fit for planting where they are wanted to remain, whilst the weaker and worst rooted layers may be planted in the nursery ground like the seedlings, and treated accordingly.

PHILLYREASTRUM, a genus of plants in Vaillant's system of botany; called morinda by Linnæus.

PHILO, an ancient Greek writer, who was of a noble family among the Jews, and flourished at Alexandria during the reign of Caligula; to whom he was sent at the head of an embassy from the Jews, to defend them against Appion, A. D. 42. The best edition of his works was published at London in 1742 by Dr. Mangey, in 2 vols. folio. For farther particulars respecting this celebrated man, see Josephus's Antiq.; Eusebius's Eccl. Hist.; St. Jerome De Script. Eccles. Fabr. Bibl. Græc.; Cave Hist. Liter. and Mon. of the Greek Church, vol. 2.

Philo, a native of Byblos, a grammarian, who flourished in the first century, and acquired celebrity by his works; the chief of which is Sanchoniathon's History of Phœnicia, which he translated into Greek. Some fragments are extant.

Philo, a celebrated architect and writer of Byzantium, who flourished about A. A. C. 300. He wrote a treatise on Machines used in War, which is extant, in the Mathematici Veteres,

1693, folio. There is also ascribed to him, but on dubious grounds, a work, entitled De vii. Orbis Spectaculis; Romæ, 1640.

PHILOBŒOTUS, a mountain of Bœotia.

PHILOCHORUS, an ancient Greek historian, who wrote a history of Athens in seventeen books, which has not come down to us. He died A.A.C. 222.

PHILOCLES, an admiral of the Athenian fleet during the Peloponnesian war. He recommended to his countrymen to cut off the right hand of such of the enemies as were taken, that they might be rendered unfit for service. His plan was adopted by all the ten admirals except one; but their expectations were frustrated, and, instead of being conquerors, they were totally defeated at Ægospotamos by Lysander, and Philocles was put to death with the rest of his colleagues.

PHILOCRATES, an ancient author, who wrote a History of Thessaly.

PHILOCTETES, in fabulous history, the son of Pæan, was the faithful companion of Hercules: who, at his death, obliged him to swear not to discover the place where his ashes were interred, and presented him with his arrows dipped in the Hydra's blood. The Greeks at the siege of Troy being informed by an oracle that they could never take that city without those fatal arrows, went to Philoctetes, and insisted upon his discovering where he had left his friend; when Philoctetes, to evade the guilt of perjury, let them know where Hercules was entombed, by stamping upon the place: but he was punished for the violation of his oath, by dropping an arrow upon that foot; which, after giving him great agony, was at length cured by Machaon. He was afterwards taken by Ulysses to the siege of Troy, where he killed Paris with one of his arrows.

PHILOCYPRUS, a king of Cyprus in the age of Solon, by whose advice he changed the situation of a city, which, in gratitude to the Athenian legislator, he named Soli.

PHILOLAUS, of Crotona, a celebrated philosopher of antiquity, of the school of Pythagoras, to whom that philosopher's Golden Verses have been ascribed. 'He was,' says Dr. Enfield, 'a disciple of Archytas, and flourished in the time of Plato. It was from him that Plato purchased the written records of the Pythagorean system. Interfering in affairs of state, he fell a sacrifice to political jealousy. Philolaus treated the doctrine of nature with great subtlety, but with great obscurity; referring every thing that exists to mathematical principles. He taught that reason, improved by mathematical learning, is alone capable of judging concerning the nature of things; that the whole world consists of infinite and finite; that number subsists by itself, and is the chain which by its power sustains the eternal frame of things; that the Monad is not the sole principle of all things, but that the Binary is necessary to furnish materials, from which all subsequent numbers may be produced; that the world is one whole, which has a fiery centre, about which the ten celestial spheres revolve, heaven, the sun, the planets, the earth, and the moon; and the sun has a vitreous surface, whence the fire diffused through the world is reflected, rendering the mirror from which it is reflected visible; that all things are preserved in harmony by the law of necessity; and that the world is liable to destruction both by fire and by water. From this summary of the doctrine of Philolaus it appears probable that, following Timæus, whose writings he possessed, he so far departed from the Pythagorean system as to conceive two independent principles in nature, God and matter, and that it was from the same source that Plato derived his doctrine upon this subject.'

PHILOL'OGER, *n. s.* } Gr. φιλολογος. One
PHILOL'OGY, } whose chief study is
PHILOLOG'ICAL, *adj.* } language; the study of languages.

It is not good to look too long upon these turning wheels of vicissitude, lest we become giddy: as for the *philology* of them, that is but a circle of tales. *Bacon.*

Philologers and critical discoursers, who look beyond the shell and obvious exteriors of things, will not be angry with our narrower explorations. *Browne.*

You expect that I should discourse of this matter like a naturalist, not a *philologer*. *Boyle.*

The best *philologers* say, that the original word does not only signify domestick, as opposed to foreign, but also private, as opposed to common. *Sprat's Sermons.*

Temper all discourses of *philology* with interspersions of morality. *Walker.*

Studies, called *philological*, are history, language, grammar, rhetorick, poesy, and criticism. *Watts.*

PHILOLOGY is composed of φιλος, a lover, and λογος, a word, and imports the desire of investigating the properties and relations of words, or language; yet it has often been used in a more extensive signification: and has comprehended the study of grammar, criticism, etymology, the interpretation of ancient authors, antiquities; and, in a word, every thing relating to ancient manners, laws, religion, government, language, &c.

This seems any thing but an adherence to precision in matters which particularly require it. Returning to the proper signification of the term, our article GRAMMAR may be referred to as containing some original and comprehensive observations on the first principles of written or spoken language, i. e. of philology: the article LANGUAGE supplies, after Adelung, a complete sketch of the 'General History of Languages.' We need here only add,

Languages, in general, may be divided into,

1. Ancient languages; which are those that have become extinct with the people who spoke them, or have been so altered and disfigured that they no longer resemble the languages which were spoken by those people.

2. Oriental languages; the study of which is necessary in order to the understanding of the text of the Holy Scriptures, especially the Old Testament.

3. Learned languages; which are those that are indispensably necessary in the study of polite literature; and the critical knowledge of any of the modern tongues: which, while there were people in the world who made them their com-

mon language, were called living; but, as no nation now makes use of them, they are called dead languages, and are therefore to be learned from books or in schools.

4. Modern languages; in which are distinguished, first, the common languages of the European nations; and, secondly, the languages of the people who inhabit the other parts of the world. See LANGUAGE.

PHILOMATHES, a lover of learning or science.

PHILOMBROTUS, an archon of Athens, during whose government, the republic being distracted by factions, the regulation of the state was entrusted to Solon, who, by his wisdom and integrity, brought the citizens to a right understanding.

PHIL'OMEL, *n. s.* } From Philomela.
PHILOME'LA. } Changed into a bird.
The nightingale.

> Time drives the flocks from field to fold,
> When rivers rage, and rocks grow cold,
> And *philomel* becometh dumb. *Shakspeare.*
> Admires the jay the insects gilded wings,
> Or hears the hawk, when *philomela* sings? *Pope.*
> The shepherd touched his reed; sweet *Philomel*
> Essayed, and oft essayed, to catch the strain,
> And treasuring, as on her ear they fell,
> The numbers, echoed note for note again.
> *Cowper.*

PHILOMELA, in fabulous history, a daughter of Pandion king of Athens, and sister to Procne, who had married Tereus king of Thrace. Procne, being much attached to Philomela, became melancholy till she prevailed upon her husband to go to Athens and bring her sister to Thrace. Tereus obeyed; but had no sooner obtained Pandion's permission to conduct Philomela to Thrace, than he fell in love with her, dismissed the guards, offered violence to Philomela, and cut out her tongue that she might not discover his barbarity and villany. He then confined her in a lonely castle; and, returning to Thrace, told Procne that Philomela had died by the way. On this Procne put on mourning for Philomela; but a year had scarcely elapsed before Philomela, having described on a piece of tapestry her misfortunes and the brutality of Tereus, privately conveyed it to Procne, who hastened to deliver her sister from confinement, and concerted with her measures for punishing Tereus. During the festival of Bacchus she murdered her son Itylus, then in the sixth year of his age, and served him up as food before her husband. Tereus, in the midst of his repast, called for Itylus; when Procne informed him that he was then feasting on his flesh, and Philomela, throwing on the table the head of Itylus, convinced him of the reality of the story. He now drew his sword to punish the parricidal sisters, but was changed, we are told, into a hoopoe, Philomela into a nightingale, Procne into a swallow, and Itylus into a pheasant. This tragedy happened at Daulis in Phocis; but Pausanias and Strabo, who mention the story, are silent about the transformation; and the former observes that Tereus, after this bloody repast, fled to Megara, where he killed himself. The inhabitants raised a monument to his memory, where they offered yearly sacrifices, and placed pebbles instead of barley. On this monument the hoopoes were first observed. Procne and Philomela died through excess of grief; and, as the voices of the nightingale and swallow are peculiarly mournful, the poets embellished the fable by the supposed metamorphoses.

PHILOMELUM, a town of Phrygia.

PHILOMELUS, or, as Plutarch calls him, PHILOMEDES, a general of Phocis, who plundered the temple of Apollo at Delphi. See PHOCIS. He died A.A.C. 354.

PHIL'OMOT, *adj.* Corrupted from French *feuille morte.* A dead leaf. Colored like a dead leaf.

> One of them was blue, another yellow, and another *philomot*; the fourth was of a pink color, and the fifth of a pale green. *Addison.*

PHILONIUM, in pharmacy, a kind of somniferous anodyne opiate, taking its name from Philo the inventor.

PHILONIZE. Lat. philonizo. To imitate the style and sentiments of Philo. This verb, and its companion Platonize, owe their derivation and existence to the circumstance of Philo, the Alexandrian Jewish philosopher, having imbibed the philosophical principles of Plato so thoroughly, and imitated his manner so closely, that in reading Philo's works it became a proverbial saying, 'Aut Plato Philonizat, aut Philo Platonizat,' i.e. 'Either Plato Philonizes, or Philo Platonizes.' See PHILO.

PHILONUS, a village of Egypt.

PHILOPATER, a surname of the fourth Ptolemy. See EGYPT and PTOLEMY.

PHILOPŒMEN, a celebrated general of the Achæan league, born in Megalopolis, in Peloponnesus. He was no sooner able to bear arms than he entered among the troops which Megalopolis sent against Laconia. When Cleomenes III., king of Sparta, attacked Megalopolis, Philopœmen displayed much courage. He signalised himself no less in the battle of Sellasia, where Antigonus defeated Cleomenes. Antigonus made very advantageous offers to gain him over to his interest; but he rejected them. He went to Crete, then engaged in war, and served several years as a volunteer, till he acquired a complete knowledge of the military art. On his return home he was appointed general of the horse; in which command he behaved so well, that the Achæan horse became famous all over Greece. He was soon after appointed general of all the Achæan forces, when he applied himself to reestablish military discipline among the troops of the republic, which he found in a very low condition. For eight months he exercised his troops daily, when news was brought him that Machanidas was advancing, at the head of a numerous army, to invade his country. He accordingly, taking the field, met the enemy in the territories of Mantinea, where a battle was fought, in which he completely routed the Lacedæmonians, and killed their leader with his own hand; this happened about A.A.C. 204. But what most of all raised the fame and reputation of Philopœmen was his joining the powerful state of Lacedæmon to the Achæan commonwealth; by which means the Achæans came to eclipse all the other states of Greece. This memorable event happened in the year 191. The Lacedæmonians, overjoyed

to see themselves delivered from the oppressions they had long groaned under, ordered the palace and furniture of their tyrant Nabis to be sold; and the sum accruing thence, to the amount of 120 talents, to be presented to Philopœmen, as a token of their gratitude. On this occasion, so great was the opinion which the Spartans had of his disinterestedness, that no one could be found who would take upon him to offer the present, until Timolaus was compelled by a decree. The money however he rejected, declaring he would always be their friend without expense. About two years after this, the city of Messene withdrew itself from the Achæan eague. Philopœmen attacked them; but was wounded, fell from his horse, was taken prisoner, and poisoned by Dinocrates, the Messenian general, in his seventieth year, A. A. C. 183. Philopœmen drank the cup with pleasure, when he heard from the jailor that his countrymen were victors. The Achæans, to revenge his murder, marched up to Messene, where Dinocrates, to avoid their vengeance, killed himself. The rest concerned in his murder were sacrificed on his tomb, and annual sacrifices were held to his memory by the Megalopolitans. To the valor and prudence of Philopœmen Achaia owed her glory, which upon his death declined; whence Philopœmen was called the last of the Greeks, as Brutus was afterwards styled the last of the Romans.

PHILOPONUS (John), a learned grammarian and philologist of the seventh century, born in Alexandria. He was of so studious a disposition that he was styled the Lover of Labor. He published many of Aristotle's tracts, with learned commentaries.

PHILOS'OPHEME, *n. s.*
PHILOS'OPHER,
PHILOSOPH'IC, *adj.*
PHILOSOPH'ICAL,
PHILOSOPH'ICALLY, *adv.*
PHILOS'OPHISE, *v. a.*
PHILOS'OPHY, *n. s.*
} Gr. φιλοσοφημα; Fr. *philosophe;* Lat. *philosophus.* Principle of reasoning; theorem: a philosopher is a man of profound research in natural or moral knowledge: philosophic and philosophical, belonging to, or skilled in philosophy; rational; wise; temperate; the adverb corresponding: to philosophise is to act or reason as a philosopher: philosophy, natural or moral knowledge; system of knowledge or reasoning; argumentation.

I had never read, heard, nor seen any thing, I had never any taste of *philosophy* nor inward feeling in myself, which for a while I did not call to my succour. *Sidney.*

Many sound in belief have been also great *philosophers.* *Hooker.*

A drunkard is a good *philosopher;* for he thinks aright; the world goes round. *Overbury.*

We have our *philosophical* persons to make modern and familiar things supernatural and causeless. *Shakspeare.*

Hang up *philosophy;*
Unless *philosophy* can make a Juliet,
Displant a town, reverse a prince's doom,
It helps not. *Id.*

The progress you have made in *philosophy,* hath enabled you to benefit yourself with what I have written. *Digby.*

The *philosopher* hath long ago told us, that, according to the divers natures of things, so must the evidences for them be; and that 'tis an argument of an undisciplined wit not to acknowledge this. *Wilkins.*

That stone
Philosophers in vain so long have sought. *Milton*

Others in virtue placed felicity:
The stoick last in *philosophick* pride
By him called virtue; and his virtuous man,
Wise, perfect in himself, and all possessing. *Id.*
Of good and evil much they argued then,
Vain wisdom all and false *philosophy.* *Id.*

Qualities occult to Aristotle, must be so to us; and we must not *philosophise* beyond sympathy and antipathy. *Glanville.*

The law of commonweals that cut off the right hand of malefactors, if *philosophically* executed, is impartial; otherwise the amputation not equally punisheth all. *Browne.*

That part of chemistry, which is applied to the transmutation of metals, and the search of the *philosopher's-stone,* has enchanted, not to say turned the brains of many. *Temple.*

They all our famed *philosophers* defie,
And would our faith by force of reason try. *Dryden.*

This is what nature's wants may well suffice:
But, since among mankind so few there are
Who will conform to *philosophick* fare,
I'll mingle something of our times to please. *Id.*

No man has ever treated the passion of love with so much delicacy of thought and of expression, or searched into the nature of it more *philosophically* than Ovid. *Id.*

Some of our *philosophizing* divines have too much exalted the faculties of our souls, when they have maintained that by their force mankind has been able to find out God. *Id.*

Two doctors of the schools were *philosophizing* upon the advantages of mankind above all other creatures. *L'Estrange.*

If the *philosophers* by fire had been so wary in their observations and sincere in their reports, as those, who call themselves *philosophers,* ought to have been, our acquaintance with the bodies here about us had been yet much greater. *Locke.*

We shall in vain interpret their words by the notions of our *philosophy,* and the doctrines in our schools. *Id.*

Adam, in the state of innocence, came into the world a *philosopher,* which sufficiently appeared by his writing the natures of things upon their names; he could view essences in themselves, and read forms without the comment of their respective properties. *South.*

When the safety of the publick is endangered, the appearance of a *philosophical* or affected indolence must arise either from stupidity or perfidiousness. *Addison's Freeholder.*

How could our chymick friends go on
To find the *philosophick* stone? *Prior.*

His decisions are the judgment of his passions not of his reason, the *philosophy* of the sinner not of the man. *Rogers.*

Acquaintance with God is not a speculative knowledge, built on abstracted reasonings about his nature and essence, such as *philosophical* minds often busy themselves in, without reaping from thence any advantage towards regulating their passions, but practical knowledge. *Atterbury.*

If natural laws were once settled, they are never to be reversed; to violate and infringe them is the same as what we call miracle, and doth not sound very *philosophically* out of the mouth of an atheist. *Bentley's Sermons.*

You will learn how to address yourself to children for their benefit, and derive some usual *philosophemes* for your own entertainment. *Watts.*

What does *philosophy* impart to man
But undiscovered wonders? Let her soar
Even to her proudest heights; to where she caught
The soul of Newton and of Socrates,
She but extends her scope of wild amaze
And admiration. *K. White.*

The Philosopher's Stone was the greatest object of alchemy, a long sought for preparation, which, when found, was expected to convert all the true mercurial part of metal into pure gold, better than any that is dug out of mines, or perfected by the refiner's art. Some Greek writers in the fourth and fifth centuries speak of this art as being then known; and towards the end of the thirteenth, when the learning of the east had been brought hither by the Arabians, the same pretensions began to spread through Europe. See Alchemy, Chemistry, and Transmutation. Alchemists attempted to arrive at the making of gold by three methods: the first by separation; for every metal known, it was affirmed, contains some quantity of gold; only, in most, the quantity is so little as not to defray the expense of getting it out. The second by maturation; for they thought mercury the base and matter of all metals; that quicksilver purged from all heterogeneous bodies would be much heavier, denser, and simpler, than the native quicksilver, &c.; and that by subtilising, purifying, and digesting it with much labor, it was possible to convert it into pure gold. The third method was by transmutation, or turning other metals into pure gold, by melting them in the fire, and casting a quantity of a certain preparation into the fused matter. That which was to work the desired change in the metals was called the philosopher's stone. This pretended secret was encouraged by four licenses, granted to different projectors during the reign of Henry VI. and in succeeding times was patronised all over Europe.

PHILOSOPHY.

Philosophy, Gr. φιλοσοφια, of φιλεω, to love, and σοφια, is thus stated by Cicero to owe its origin to the modesty of Pythagoras:—'Every one knows that among the Greeks there were seven eminent men, who have since been universally denominated the 'seven wise men' of Greece: that, at a still earlier period, Lycurgus, and, even in the heroic ages, Ulysses and Nestor, were called wise men; in short, that this appellation has, from the most ancient times, been given to those who have devoted themselves to the contemplation of nature. This title continued in use till the time of Pythagoras. It happened, while this great man was at Phlius, that Leon, the chief of the Phliusians, was exceedingly charmed with the ingenuity and eloquence with which he discoursed upon various topics, and asked him in what art he principally excelled; to which Pythagoras replied that he did not profess himself master of any art, but that he was a 'philosopher.' Leon, struck with the novelty of the term, asked Pythagoras who were philosophers, and in what they differed from other men? Pythagoras replied that, as in the public games, while some are contending for glory, and others are buying and selling in pursuit of gain, there is always a third class of persons, who attend merely as spectators; so, in human life, amidst the various characters of men, there is a select number of those who, despising all other pursuits, assiduously apply themselves to the study of nature, and the search after wisdom: these, added Pythagoras, are the persons whom I call philosophers.' Cicero Tuscul. Disp. l. v. c. 3.

Happy had it been for science and for mankind had this ambition to be considered 'searchers after wisdom' rather than 'wise men' been perpetuated: but those who adopted the new term soon evinced equal vanity with their predecessors; and, according to Quintilian, 'despising the occupation of the orator (no very decisive proof of folly, however), employed themselves in prescribing rules for the conduct of life, and insolently assumed the title of the *sole* professors of wisdom.' In its usual acceptation the term philosophy has been taken to denote a science, or collection of sciences, of which the universe is the object. Pythagoras has defined it as επιστημη των οντων, 'the knowledge of things existing:' Cicero, after Plato, 'scientia rerum divinarum et humanarum cum causis;' and Bacon, 'interpretatio naturæ.' M. Chauvin, deriving the word from φιλιά, desire or study, and σοφια, understands it to mean the desire or study of wisdom; for, says he, 'Pythagoras, conceiving that the application of the human mind ought rather to be called study than science, set aside the appellation of wise as too assuming.' Whether any of these definitions be sufficiently precise, and at the same time sufficiently comprehensive, may be questioned; but if philosophy, in its utmost extent, be capable of being adequately defined, it is not here that the definition would be given. 'Explanation,' says an acute writer, 'is the first office of a teacher; definition, if it be good, is the last of the enquirer after truth; but explanation is one thing, and definition quite another.'

The principal objects of philosophy, taken in its most general sense, are God, nature, and man. That part of it which treats of God is called theology; that which treats of nature physics and metaphysics; and that which treats of man logic and ethics.

An ingenious contemporary says, 'By philosophy we mean the knowledge of the reasons of things, in opposition to history, which is the bare knowledge of facts: or to mathematics, which is the knowledge of the quantity of things or their measures; and well observes,

'These three kinds of knowledge ought to be joined together as much as possible. History furnishes matter, principles, and practical exa-

minations, and mathematics complete the evidence. Philosophy being the knowledge of the reason of things, all arts must have their peculiar philosophy, which constitutes their theory: not only law and physic, but the lowest and most abject arts are not destitute of their reasons, which might usefully employ the time of the studious; and the advantages resulting from this kind of employment have been amply manifested in the discoveries of modern times. One great obstacle to the progress of arts and sciences has been the neglect of practice in speculative men, and the ignorance and contempt of theory in mere practical men. What chimeras and absurdities the neglect of experience and practice has produced need not be mentioned; the mischiefs arising from a neglected theory are not so obvious; yet certainly it retards the progress of arts. All invention or improvement must be either casual or rational, including analogy or inference from similar cases, under the term rational. Now, although the foundations of arts have often been owing to some casual discovery, as gunpowder, or the loadstone, yet is this not to be trusted to alone. Improvements do not always flow from this source, but rather from the reflections of artists; and if these reflections were rendered more distinct, more communicable, and easier to be retained, by the proper use of signs and other philosophical helps, great advantages might be expected: it being certain that philosophical knowledge is more extensive, and more sure in the application; and besides gives a pleasure to the mind not to be expected from that which is merely historical. The bare intelligence and memory of philosophical propositions, without any ability to demonstrate them, is not philosophy, but history only. However, where such propositions are determinate and true, they may be usefully applied in practice, even by those who are ignorant of their demonstrations. Of this we see daily instances in the rules of arithmetic, practical geometry, and navigation; the reasons of which are often not understood by those who practise them with success. And this success in the application produces a conviction of mind, which is a kind of medium between philosophical, or scientifical, and historical knowledge.'

We are of opinion that this is a term of such immensely wide and general import as to be capable of little satisfactory treatment in a compendium of science. Our aim has been to treat fully and philosophically of each of the great branches of human knowledge, as they successively present themselves in our alphabet; not neglecting that of the science of mind itself; or the best account we could obtain of the speculations of our ablest predecessors on the nature and operations of human thought. See the articles LOGIC and METAPHYSICS. Nor have we neglected to present the reader with the substance of the most important doctrines of ancient and modern times on the subjects ordinarily embraced under the term ETHICS, or MORAL PHILOSOPHY. See the last of these articles. We refer also to the article THEOLOGY, as suggesting the leading points and influences in which all true mental and moral philosophy will terminate. The article PHYSICS, in this volume, will dispose of almost every other principal branch of philosophy, taken in its widest sense. This paper will be occupied chiefly with an historical sketch of certain principal philosophical systems; and of the claims of experimental philosophy.

SECT. I.—ANCIENT AND EXPLODED SYSTEMS.

Of the *Chaldean* philosophy much has been said, but very little is known. Astronomy seems to have been their favorite study; and notwithstanding their extravagant assertions of the antiquity of that science, which they pretend their ancestors had continued through a period of 470,000 years, Callisthenes, upon the most minute enquiry, which he made at the desire of Aristotle, found that their observations reached no farther back than 1903 years, or A. A. C. 2234. Even this is a more early period than Ptolemy allows their science; for he mentions no Chaldean observations prior to the era of Nabonassor, or 747 years before Christ. That they cultivated something which they called philosophy, at a much earlier period than this, cannot be questioned; for Aristotle, on the credit of the most ancient records, speaks of the Chaldean magi as prior to the Egyptian priests, who were certainly men of learning, before the time of Moses. For any other science than that of the stars we do not read that the Chaldeans were famous; and this seems to have been cultivated by them chiefly as the foundation of judicial astrology. If any credit be due to Plutarch and Vitruvius, who quote Berosus (see BEROSUS), it was the opinion of the Chaldean wise men that an eclipse of the moon happens when that part of its body which is destitute of fire is turned towards the earth. Their cosmogony, as given by Berosus, and preserved by Syncellus, seems to be this, that all things in the beginning consisted of darkness and water; that a divine power, dividing this humid mass, formed the world; and that the human mind is an emanation from the Divine nature.

The claim of the *Egyptians* to an early knowledge of nature is certainly well-founded; but, as their science was the immediate source of that of the Greeks, we shall defer our notice of it for the present, and turn our attention to the Indian philosophy, as it was cultivated from a very early period by the brachmans and gymnosophists. We pass over Persia, because we know of no science peculiar to that kingdom, except the doctrines of the magi, which were religious rather than philosophical; and of them the reader will find an account under the words MAGI, POLYTHEISM, and ZOROASTER.

We are certain that the *Indian* philosophers, from whatever quarter they received their philosophy, were held in high repute at a period of very remote antiquity, since they were visited by Pythagoras and other sages of ancient Greece. Yet they seem to have been in that early age, as well as at present, more distinguished for the severity of their manners than for the acquisition of science. The philosophy of the Indians has indeed from the beginning been engrafted on their religious dogmas, and seems to be a compound of extravagant metaphysics and su-

perstition, with a very slight mixture of the knowledge of nature. The pundits of Hindostan allow no powers whatever to matter, but introduce the Supreme Being as the immediate cause of every effect, however trivial. 'Brehm, the spirit of God,' says one of their most revered authorities, 'is absorbed in self-contemplation. The same is the mighty Lord, who is present in every part of space, whose omnipresence, as expressed in the Reig-Beid, or Rigveda, I shall now explain. Brehm is one, and to him there is no second; such is truly Brehm. His omniscience is self-inspired or self-intelligent, and its comprehension includes every possible species. To illustrate this as far as I am able; the most comprehensive of all comprehensive faculties is omniscience: and, being self-inspired, it is subject to none of the accidents of mortality, conception, birth, growth, decay, or death; neither is it subject to passion or vice. To it the three distinctions of time, past, present, and future, are not. To it the three modes of being are not (to be awake, to sleep, and to be unconscious). It is separated from the universe, and independent of all. This omniscience is named Brehm. By this omniscient spirit the operations of God are enlivened. By this Spirit also the twenty-four powers of nature are animated. How is this? As the eye by the sun, as the pot by the fire, as iron by the magnet, as variety of imitations by the mimic, as fire by the fuel, as the shadow by the man, as dust by the wind, as the arrow by the spring of the bow, and as the shade by the tree; so by this Spirit the world is endued with the powers of intellect, the powers of the will, and the powers of action: so that if it emanates from the heart by the channel of the ear, it causes the perception of sounds; if it emanates from the heart by the channel of the skin, it causes the perception of touch; if it emanates from the heart by the channel of the eye, it causes the perception of visible objects; if it emanates from the heart by the channel of the tongue, it causes the perception of taste; if it emanates from the heart by the channel of the nose, it causes the perception of smell. This also invigorating the five members of action, the five members of perception, the five elements, the five senses, and the three dispositions of the mind, &c., causes the creation or the annihilation of the universe, while itself beholds every thing as an indifferent spectator.' From this quotation, it is plain that all the motions in the universe, and all the perceptions of man, are, according to the brahmins, caused by the immediate agency of the Spirit of God, which seems to be here considered as the soul of the world. And it appears from some papers in the Asiatic Researches, that the most profound of these Oriental philosophers, and even the authors of their sacred books, believe not in the existence of matter as a separate substance. Sir W. Jones says they hold an opinion respecting it similar to that of the celebrated Berkeley.

We have shown elsewhere that the metaphysical doctrines of the brahmins respecting the human soul differ not from those of Pythagoras and Plato; and that they believe it to be an emanation from the great soul of the world, which, after many transmigrations, will be finally absorbed in its parent substance. From the brahmins believing in the soul of the world, not only as the agent, but as the immediate cause of every motion in nature, we can hardly suppose them to have made any great progress in that science which in Europe is cultivated under the name of physics. They have no inducement to investigate the laws of nature; because, according to the first principles of their philosophy, which, together with their religion, they believe to have been revealed from heaven, every phenomenon, however regular, or however anomalous, is produced by the voluntary act of an intelligent mind. Yet in astronomy, geometry, and chronology, they appear to have made some proficiency at a very early period (see ASTRONOMY, Index). Their chronology and astronomy are indeed full of those extravagant fictions; but their calculations of eclipses, and their computations of time, are conducted upon scientific principles. 'They suppose,' says Mr. Halhed, 'that there are fourteen spheres, seven below and six above the earth. The seven inferior worlds are said to be altogether inhabited by an infinite variety of serpents, described in every monstrous figure that the imagination can suggest. The first sphere above the earth is the immediate vault of the visible heavens, in which the sun, moon, and stars are placed. The second is the first paradise and general receptacle of those who merit a removal from the lower earth. The third and fourth are inhabited by the souls of those men who, by the practice of virtue and dint of prayer, have acquired an extraordinary degree of sanctity. The fifth is the reward of those who have all their lives performed some wonderful act of penance and mortification, or who have died martyrs for their religion. The highest sphere is the residence of Brahma and his particular favorites, such as those men who have never uttered a falsehood during their whole lives, and those women who have voluntarily burned themselves with their husbands. All these are absorbed in the divine essence.' On ethics, the Hindoos have nothing that can be called philosophy. Their duties, moral, civil, and religious, are all laid down in their Vedas and Shasters, and enjoined by what they believe to be divine authority; which supersedes all reasoning concerning their fitness or utility.

Respecting the ancient philosophy of the *Arabians* and *Chinese*, the narrow limits of such an abstract as this hardly admit of our mentioning the conjectures of the learned. There is indeed sufficient evidence that both nations were, at a very early period, observers of the stars; and that the Chinese had even a theory by which they foretold eclipses; but there is reason to believe that the Arabians, like other people in their circumstances, were little more than judicial astrologers. Pliny makes mention of their magi, whilst later writers tell us that they were famous for their ingenuity in solving enigmatical questions, and for their skill in the arts of divination: but the authors of Greece are silent concerning their philosophy; and there is no work

of greater antiquity than the Koran extant among them.

We pass, therefore, to the *Phœnicians*, whose commercial celebrity has induced many learned men to allow them great credit for early science. If it be true indeed, as it seems probable, that the ships of this nation had doubled the Cape of Good Hope, and almost encompassed the peninsula of Africa long before the era of Solomon, we cannot doubt that the Phœnicians had made great proficiency in navigation and astronomy, at a very remote period. Nor were these the only sciences cultivated by that ancient people: Moschus or Mochus, a Phœnician, who, according to Strabo, flourished before the Trojan war, was the author of the atomic philosophy, afterwards adopted by Leucippus, Democritus, and others among the Greeks; and it was with some of the successors of this sage that Pythagoras, as Jamblicus tells us, conversed at Sidon, and from them received his doctrine of Monads. Another proof of the early progress of the Phœnicians in philosophy may be found in the fragments of their historian Sanchoniatho, which have been preserved by Eusebius. This ancient writer teaches that, according to the wise men of his country, all things arose at first from the necessary agency of an active principle, upon a passive chaotic mass, which he calls 'mot.' This chaos, Cudworth thinks, was the same with the elementary water of Thales, who was also of Phœnician extraction; but Mosheim justly observes, that it was rather dark air, since Philo translates it αερα ζοφωδη. Besides Mochus and Sanchoniatho, Cadmus, who introduced letters into Greece, may undoubtedly be reckoned a philosopher. Several other Phœnician philosophers are mentioned by Strabo; but as they flourished at a later period, and philosophised after the systematic mode of the Greeks, they fall not properly under our notice. We pass on therefore to the philosophy of Egypt.

The *Greeks* confess that all their learning was derived from the Egyptians, either imported immediately by their own philosophers, or brought through Phœnicia by the sages of the east; and we know from higher authority that, at a period so remote as the birth of Moses, 'the wisdom of the Egyptians was famous.' Yet the history of Egyptian learning and philosophy, though men of the first eminence, both ancient and modern, have bestowed much pains in attempts to elucidate it, still remains involved in clouds of doubt and hieroglyphics. That they had some knowledge of physiology, arithmetic, geometry, and astronomy, are facts which cannot be questioned; but there is reason to believe that even these sciences were in Egypt pushed no farther than to the uses of life. That they believed in the existence of incorporeal substances is certain; because Herodotus assures us that they were the first asserters of the immortality, pre-existence, and transmigration of human souls, which they could not have been without believing the soul to be at least incorporeal, if not immaterial. Plato says that Thoth, Theut, or Taaut, called by the Greeks Hermes, and by the Romans Mercury, was the inventor of letters; and, lest we should suppose that by those letters nothing more is meant than picture writing or symbolical hieroglyphics, it is added, that he distinguished between vowels and consonants, determining the number of each. The same philosopher attributes to Thoth the invention of arithmetic, geometry, astronomy, and hieroglyphic learning. The art of alchymy also has been said to have been professed by the ancient Egyptians; and from Hermes, their celebrated philosopher, it has been called the Hermetic art.

When the intercourse between the Egyptians and Greeks first commenced, the wisdom of the former people consisted chiefly in the science of legislation and civil policy, and the philosopher, the divine, the legislator, and the poet, were united in the same person. Their cosmogony differed little from that of the Phœnicians. They held that the world was produced from chaos by the energy of an intelligent principle; and they likewise conceived that there is in nature a continual tendency towards dissolution. In Plato's Timæus, an Egyptian priest is introduced describing the destruction of the world, and asserting that it will be effected by means of water and fire. They conceived that the universe undergoes a periodical conflagration; after which all things are restored to their original form, to pass again through a similar succession of changes.

'Of preceptive doctrine' says Dr. Enfield, in his History of Philosophy, 'the Egyptians had two kinds, the one sacred, the other vulgar. The former, which respected the ceremonies of religion and the duties of the priests, was doubtless written in the sacred books of Hermes, but was too carefully concealed to pass down to posterity. The latter consisted of maxims and rules of virtue, prudence, or policy. It is in vain to look for accurate principles of ethics among an ignorant and superstitious people. And that the ancient Egyptians merited this character is evident from this single circumstance, that they suffered themselves to be deceived by impostors, particularly by the professors of the fanciful art of astrology.'

Phoroneus, Cecrops, Cadmus, and Orpheus, were among the earliest instructors of the Greeks; and they inculcated Egyptian and Phœnician doctrines in detached maxims, and enforced them, not by strength of argument, but by the authority of tradition. Their cosmogonies were wholly Phœnician or Egyptian, disguised under Grecian names; and they taught a future state of rewards and punishments. The planets and the moon, Orpheus conceived to be habitable worlds, and the stars to be fiery bodies like the sun: but he taught that they are all animated by divinities; an opinion which prevailed both in Egypt and the east: and it does not appear that he gave any other proof of his doctrines, than a confident assertion that they were derived from some god. Among the Greeks, an ingenious and penetrating people, philosophy soon assumed the form of profound speculation. Two eminent philosophers arose nearly at the same period, who may be considered as the parents not only of Grecian science, but of almost all the science cultivated in Europe, prior to the era of lord Bacon: these were Thales and Pythagoras; of whom the former founded the Ionic school, and

the latter the Italic: from which two sprung the various sects into which the Greek philosophers were afterwards divided. A bare enumeration of these sects is all that our limits will afford; and we shall give it in the perspicuous language of Dr. Enfield, referring our readers for a fuller account than we can give of their respective merits to his translation of Brucker's history.

I. 'Of the Ionic school were, 1. The Ionic sect proper, whose founder Thales had as his successors Anaximenes, Anaxagoras, Diogenes, Apolloniates, and Archelaus. 2. The Socratic school, founded by Socrates, the principal of whose disciples were Xenophon, Æschines, Cimon, Cebes, Aristippus, Phædo, Euclid, Plato, Antisthenes, Critias, and Alcibiades. 3. The Cyrenaic sect, of which Aristippus was the author; his followers were, his daughter Arete, Hegesias, Aniceris, Theodorus, and Bion. 4. The Megaric or Eristic sect, formed by Euclid of Megara: to whom succeeded Eubulides, Diodorus, and Stilpo, famous for their logical subtlety. 5. The Eliac or Eretriac school, raised by Phædo of Elis, who, though he closely adhered to the doctrine of Socrates, gave name to his school. His successors were Plistanus and Menedemus; the latter of whom, being a native of Eretria, transferred the school and name to his own country. 6. The Academic sect, of which Plato was the founder. After his death, many of his disciples deviating from his doctrine, the school was divided into the old, new, and middle academies. 7. The Peripatetic sect, founded by Aristotle, whose successors in the Lyceum were Theophrastus, Strabo, Lycon, Aristo, Critolaus, and Diodorus. Among the Peripatetics, besides those who occupied the chair, were also Dicæarchus, Eudemus, and Demetrius Phalereus. 8. The Cynic sect, of which the author was Antisthenes, whom Diogenes, Onesicritus, Crates, Metrocles, Menippus, and Menedemus, succeeded. In the list of Cynic philosophers must also be reckoned Hipparchis, the wife of Crates. 9. The Stoic sect, of which Zeno was the founder. His successors in the porch were Persæus, Aristo of Chios, Herillus, Sphærus, Cleanthes, Chrysippus, Zeno of Tarsus, Diogenes the Babylonian, Antipater, Panætius, and Posidonius.

II. 'Of the Italic school were, 1. The Italic sect proper: it was founded by Pythagoras, a disciple of Pherecydes. The followers of Pythagoras were Aristæus, Mnesarchus, Alcmæon, Ecphantus, Hippo, Empedocles, Epicharmus, Ocellus, Timæus, Archytas, Hippasus, Philolaus, and Eudoxus. 2. The Eleatic sect, of which Xenophanes was the author: his successors, Parmenides, Melissus, Zeno, belonged to the metaphysical class of this sect; Leucippus, Democritus, Protagoras, Diagoras, and Anaxarchus, to the physical. 3. The Heraclitean sect, which was founded by Heraclitus, and soon afterwards expired: Zeno and Hippocrates philosophised after the manner of Heraclitus, and other philosophers borrowed freely from this system. 4. The Epicurean sect, a branch of the Eleatic, had Epicurus for its author; among whose followers were Metrodorus, Polyænus, Hermachus, Polystratus, Basilides, and Protarchus. 5. The Pyrrhonic or Sceptic sect, the parent of which was Pyrrho; his doctrine was taught by Timon the Phliasian; and after some interval was continued by Ptolemy, a Cyrenean, and at Alexandria by Ænesidemus.' Of the peculiar doctrines of these sects, the reader will in this work find a short account, either in the lives of their respective founders, or under the names of the sects themselves.

All the systematic philosophers pursued their inquiries into nature by nearly the same method. They established certain definite arrangements or classes, to some of which every thing past, present, or to come, might be referred; and having ascertained, as they thought, all that could be affirmed or denied of these classes, they proved, by a short process of syllogistic reasoning, that what is true of the class must be true of every individual comprehended under it. The most celebrated of these arrangements is that which is known by the name of categories; which Mr. Harris thinks at least as old as the era of Pythagoras. These categories are, *substance*, *quality*, *quantity*, *relation*, *action*, *passion*, *when*, *where*, *position*, and *habit*; which, according to the systematic philosophy of the Greeks comprehend every human science and every subject of human thought. 'History, natural and civil, springs,' says Mr. Harris, 'out of substance; mathematics out of quantity; optics out of quality and quantity; medicine out of the same; astronomy out of quantity and motion; music and mechanics out of the same; painting out of quality and site; ethics out of relation; chronology out of when (or time); geography out of where (or place); electricity, magnetism, and attraction, out of action and passion; and so in other instances.

'This mode of philophising spread from Greece over the whole civilised world. It was carried by Alexander into Asia, by his successors into Egypt; and it found its way to Rome after the conquest of Greece. It was adopted by the Jews, by the Christian fathers, by the Mahometan Arabs during the caliphate, and by the schoolmen through all Europe, till its futility was exposed by lord Bacon. Its professors often displayed great acuteness; but their systems were built on mere hypotheses, and supported by syllogistic wrangling. Now and then indeed a superior genius, such as Alhazen and our countryman Roger Bacon, broke through the trammels of the schools, and, regardless of the authority of the Stagyrite, made real discoveries in physical science, by experiments judiciously conducted on individual substances; but the science in repute still continued to be that of Generals.'

From the eighth to the fourteenth century of the Christian era, the whole circle of instruction, or the liberal arts, as they were called, consisted of two branches, the trivium and the quadrivium; of which the former comprehended grammar, rhetoric, and dialectics; the latter music, arithmetic, geometry, and astronomy, to which was added, about the end of the eleventh century, the study of a number of metaphysical subtleties equally useless and unintelligible. The works of the ancient Greek philosophers had

been hitherto read only in imperfect Latin translations; and, before the scholastic system was completely established, Plato and Aristotle had been alternately looked up to as oracles in science. The rigid schoolmen, however, universally gave the preference to Aristotle; because his analysis of body into matter and form is peculiarly calculated to keep in countenance that most incredible doctrine of the Romish church (transubstantiation); and, upon the revival of Greek learning, this preference was continued after the school philosophy had begun to fall into contempt.

At last Luther and his associates set the minds of men free from the tyranny of ancient names, both in science and theology; and many philosophers sprung up in different countries of Europe, who professed to study nature, regardless of every authority but that of reason. Of these the most eminent beyond all comparison was Francis Bacon, lord Verulam. This illustrious man, having read with attention the writings of the most celebrated ancients, and made himself master of the sciences which were then cultivated, soon discovered the absurdity of pretending to account for the phenomena of nature by syllogistic reasoning from hypothetical principles; and, with a boldness becoming a genius of the first order, undertook to give a new chart of human knowledge. This he did in his two admirable works, entitled 1. De Dignitate et Augmentis Scientiarum; and 2. Novum Organum Scientiarum, sive Judicia vera de Interpretatione Naturæ. In the former of these works he takes a very minute survey of the whole circle of human science, which he divides into three great branches, history, poetry, and philosophy, corresponding to the three faculties of the mind. memory, imagination, and reason. Each of these general heads is subdivided into minuter branches, and reflections are made upon the whole, though we can neither copy nor abridge here. The purpose of the Novum Organum is to point out the proper method of interpreting nature; which the author shows can never be done by the logic which was then in fashion, but only by a painful and fair induction. This great man was no less an enemy to hypotheses and preconceived opinions, which he calls idola theatri, than to syllogisms; and since his days almost every philosopher of eminence, except Descartes and his followers (see CARTES), has professed to study nature according to the method so accurately laid down in the Novum Organum. Of this mode of philosophising we shall now give a short but accurate view, by stating its objects, comparing it with that which it superseded, explaining its rules, and pointing out its uses.

SECT. II.—VIEW OF LORD BACON'S PHILOSOPHY.

That unbounded object of the contemplation, curiosity, and researches of man, the universe, may be considered in various important points of view. It may be considered merely as a collection of existences, related to each other by means of resemblances and distinctions; situation, succession, and derivation, as making parts of a whole. In this view it is the subject of pure description: and, in order to acquire a knowledge of the universe in this point of view, we must enumerate all the beings in it, mention their sensible qualities, and mark all the relations for each. But this would be labor immense; and, when done, an undistinguishable chaos. A book containing every word of a language would only give us the materials of this language. To make it comprehensible, it must be put into some form, which will comprehend the whole in a small compass, and enable the mind to pass easily from one word to another. Of all relations among words, the most obvious are those of resemblance and derivation. An etymological dictionary, therefore, in which words are classed in consequence of their resemblances, and arranged by means of their derivative distinctions, will greatly facilitate the acquisition of the language.

Thus, too, the objects of nature around us may be classed according to their resemblance, and then arranged in those classes by particular distinctions. In this classification we proceed by our faculty of abstracting our attention from the circumstances in which things differ, and turning it to those only in which they agree. By this faculty we can not only distribute the individuals into classes, but also subdivide those classes into orders, genera, and species. Thus a vast number of individuals resembling each other in the single circumstance of life, composes the most extensive kingdom of animals. If it be required that they shall further resemble in the circumstance of having feathers, a prodigious number of animals are excluded, and we form the inferior class of birds. We exclude a great number of birds by requiring a further similarity of web feet, and have the order of anseres. If we add lingua citiata, we confine attention to the genus of anates. In this manner may the whole objects of the universe be arranged, divided, and subdivided, into kingdoms, classes, orders, genera, and species.

This classification and arrangement is called natural history, and is the only foundation of any extensive knowledge of nature. To the natural historian, therefore, the world is a collection of existences, the subject of descriptive arrangement. His aim is threefold: 1. To observe with care, and describe with accuracy, the various objects of the universe. 2. To determine and enumerate all the great classes of objects; to distribute and arrange them into all their subordinate classes, through all degrees of subordination, till he arrive at what are only accidental varieties, which are susceptible of no farther distribution; and to mark with precision the principles of this distribution and arrangement, and the characteristics of the various assemblages. 3. To determine with certainty the particular group to which any proposed individual belongs.

Description, therefore, arrangement, and reference, constitute the whole of his employment; and in this consists all his science.

Were the universe to continue unchanged, this would constitute the whole of our knowledge of nature; but we are witnesses of an uninterrupted

succession of changes, and our attention is continually called to the *events* which are incessantly happening around us. These form a set of objects vastly more interesting to us than the former; being the sources of almost all the pleasures or pains we receive from external objects. The study of the events which happen around us becomes highly interesting, and we are strongly incited to prosecute it; but they are so numerous and so multifarious that the labor would be immense, without some contrivance for abbreviating and facilitating it. The same help offers itself here as in the study of what may be called quiescent nature. Events, like existences, are susceptible of classification, in consequence of resemblances and distinction; and, by attention to these, we can acquire a very extensive acquaintance with active nature. Our attention must be chiefly directed to those circumstances in which many events resemble each other, while they differ perhaps in a thousand others. Then we must attend to their most general distinctions, then to distinctions of smaller extent, and so on. In this way, accordingly, we have advanced in our knowledge of active nature, and are gradually and by no means slowly, forming assemblages of events more and more extensive, and distributing these with greater and greater precision into their different classes.

In describing those circumstances of similarity among events, and in distributing them according to those similarities, it is impossible to overlook that constancy which is observed in the changes of nature, in the events which are the objects of our contemplation. Events which have once been observed to accompany each other are observed always to do so. The rising of the sun is always accompanied by the light of day, and his setting by the darkness of night. Sound argument is accompanied by conviction, impulse by motion, kindness by a feeling of gratitude, and the perception of good by desire. The uniform experience of mankind informs us that the events of nature go on in certain regular trains; and, if sometimes exceptions seem to contradict this general affirmation, more attentive observation never fails to remove the exception. Most of the spontaneous events of nature are very complicated; and it frequently requires great attention and penetration to discover the simple event amidst a crowd of unessential circumstances which are at once exhibited to our view. But, when we succeed in this discovery, we never fail to acknowledge the perfect uniformity of the event to what has been formerly observed. Hence we firmly believe that this uniformity will still continue; that fire will melt wax, will burn paper, will harden clay, as we have formerly observed it to do; and whenever we have undoubted proofs that the circumstances and situation are precisely the same as in some former case, though but once observed, we expect with confidence that the event will also be the same.

Many proofs of the universality of this law of human thought are not necessary. The whole language and actions of men are instances of the fact. In all languages there is a mode of construction used to express this relation as distinct from all others, and the conversation of the most illiterate never confounds them. The general employment of the active and passive verb is regulated by it. 'The tower was demolished by the soldiers; the town was overthrown by an earthquake;' are sentences that express two relations, and no school-boy will mistake them. The distinction therefore is perceived or felt by all. Nor is any language without general terms to express this relation, cause and effect. Nay, even brutes show that they expect the same uses of every subject which they formerly made of it; and, without this, animals would be incapable of subsistence, and man incapable of all improvement. From this alone memory derives all its value; and even the constancy or natural operation would be useless, if not matched or adapted to our purposes by this expectation of and confidence in that constancy.

The result of all the enquiries of ingenious men, to discover the foundation of this irresistible expectation, is, 'such is the constitution of the human mind.' It is a universal fact in human thought; and it appears to be an ultimate fact, not included in any other still more general. This is sufficient for making it the foundation of true human knowledge; all of which must in like manner be reduced to ultimate facts in the human thought.

This persuasion of the constancy of nature we must consider as an *instinctive* anticipation of events similar to those which we have already experienced. The general analogy of nature should have disposed philosophers to acquiesce in this. In no instance of importance to our safety or well-being are we left to the guidance of our boasted reason; God has given us the surer conduct of natural instincts. No case is so important as this; in none do we so much stand in need of a guide, which shall be powerful, infallible, and rapid in its decisions. Without it we should remain incapable of all instruction from experience, and therefore of all improvement.

Our sensations are no doubt feelings of our mind. But those feelings are accompanied by an instinctive reference to something distinct from the feelings themselves. Hence arise our perceptions of external objects, and our very notions of this externeity, if we may use the term. In like manner, this anticipation of events, this irresistible connexion of the idea of fire with the idea of burning, is also a feeling of the mind; and this feeling is by a law of human nature referred, without reasoning, to something external as its cause; and, like our sensation, it is considered as a sign of that external something. It is like the connexion of the truth of a mathematical proposition. The conviction is the sign or indication of this relation by which it is brought to our view. In the same manner, the irresistible connexion of ideas is interpreted as the sensation or sign of a necessary connexion of external things or events. These are supposed to include something in their nature which renders them inseparable companions. To this bond of connexion between external things we give the name of causation. All our knowledge of this relation of cause and effect is the knowledge of

consciousness of what passes in our own minds, during the contemplation of the phenomena of nature. If we adhere to this view of it, and put this branch of knowledge on the same footing with those called the abstract sciences, considering only the relations of ideas, we shall acquire demonstrative science. Any other view of the matter will lead us into inextricable mazes of uncertainty and error.

We thus, then, perceive that the natural procedure of our faculty of abstraction and arrangements in order to acquire a more speedy and comprehensive knowledge of natural events, presents them to our view in another form. We not only see them as similar events, but as events naturally and necessarily conjoined. And the expression of resemblance among events is also an expression of concomitancy; and this arrangement of events in consequence of their resemblance is in fact the discovery of those accompaniments. The trains of natural appearance being considered as the appointments of the Author of Nature, has occasioned them to be considered also as consequences of laws imposed on his works by their great Author, and every thing is said to be regulated by fixed laws.

There is a great resemblance between the expression natural law, and grammatical rule. Rule in grammar expresses merely a generality of fact, whether of flexion or construction. In like manner, a law of nature is to the philosopher nothing, but the expression of a generality of fact. A natural or physical law is a generally observed fact; and, whenever we treat any subject as a generally observed fact, we treat it physically. It is a physical law of the understanding, that argument is accompanied by conviction; it is a physical law of the affection that distress is accompanied by pity; it is a physical law of the material world that impulse is accompanied by motion. And thus we see that the arrangement of events, or the discovery of those general points of resemblance, is in fact the discovery of the laws of nature; and one of the greatest and most important is, that the laws of nature are constant. This view of the universe is incomparably more interesting and important than that which is taken by the natural historian; contemplating every thing that is of value to us, and, in short, the whole life and movement of the universe. This study, therefore, has been dignified with the name of philosophy and of science; and natural history has been considered as of importance only in so far as it is conducive to the successful prosecution of philosophy.

The philosopher claims a superiority on another account: he considers himself as employed in the discovery of causes, and that it is by the discovery of these relations that he communicates to the world such important knowledge. Philosophy, he says, is the science of causes. The vulgar are contented to consider the prior of two inseparably conjoined events as the cause of the other; the stroke on a bell, for instance, as the cause of sound. But it has been clearly discovered by the philosopher that between the blow on the bell and the sensation of sound, there are interposed a long train of events. The blow sets the bell a trembling; this agitates the air in contact with the bell; that the air immediately beyond it; and thus between the bell and the ear may be interposed a numberless series of events, and as many more between the first impression on the ear and that last impression on the nerve by which the mind is affected. He can no longer therefore follow the nomenclature of the vulgar. Which of the events of this train therefore is the cause of the sensation? None of them: It is that something, which inseparably connects any two of them, and constitutes their bond of union. These causes he considers as residing in one or both of the connected objects: diversities in this respect must therefore constitute the most important distinctions between them. They are therefore with great propriety called the qualities, the properties, of these respective subjects. As the events, from which we infer the existence of these qualities of things, resemble in many respects such events as are the consequences of the exertion of our own powers, these qualities are frequently denominated powers, forces, energies. Thus, from the instance of the sound of a bell, we infer the powers of impulse, elasticity, nervous irritability, and animal sensibility.

From this necessary connexion between the objects around us we not only infer the posterior event from the prior, or, in common language, the effect from the cause, but we also infer the prior from the posterior, the cause from the effect. We not only expect that the presence of a magnet will be followed by certain motions in iron filings, but, when we observe such motions, we infer the presence and agency of a magnet. Joy is inferred from merriment, poison from sudden or unaccountable death, fire from smoke, and impulse from motion. And thus the appearances of the universe are the indications of the powers of the objects in it. As all our knowledge of the sentiments of others is derived from our confidence in their veracity; so all our knowledge of nature is derived from our confidence in the constancy of her operations. A credulity in our neighbour's veracity, resulting from that law of our mental constitution by which we speak, conducts us in the one case; and the constancy of nature, by which we infer general laws from particular facts, conducts us in the other. It is by the successful study of this language of nature that we derive useful knowledge. The knowledge of the influence of motives on the mind of man enables the statesman to govern kingdoms, and the knowledge of the powers of magnetism enables the mariner to pilot a ship through the pathless ocean.

Such are the high pretensions of philosophy. It is to be wished that they be well founded; for we may be persuaded that a mistake in this particular will be fatal to the advancement of knowledge. An author of great reputation gives us an opportunity of deciding this question in the way of experiment. He says that the ancients were philosophers, employed in the discovery of causes, and that the moderns are only natural historians, contenting themselves with observing the laws of nature, but paying no attention to the causes of things. If he speaks of their professed aim, we apprehend that the assertion is

pretty just in general. With very few exceptions, indeed, it may be affirmed of his favorite Aristotle, the philosopher κατ' εξοχην, and of Sir Isaac Newton. We select these two instances, both because they are set in continual opposition by this author, and because it will be allowed that they were the most eminent students of nature (for we must not call them philosophers), in ancient and modern times.

Aristotle's professed aim, in his most celebrated writings, is the investigation of causes; and, in the opinion of this author, he has been so successful that he has hardly left any employment for his successors beside that of commenting upon his works. We must, on the other hand, acknowledge that Newton makes no such pretensions, at least in that work which has immortalised his name, and that his professed aim is merely to investigate the general laws of the planetary motions, and to apply these to the explanation of particular phenomena. Nor will we say that he has left no employment for succeeding enquirers; but, on the contrary, confess that he has only begun the study, has discovered but one law, and has enabled us to explain only the phenomena comprehended in it. But his investigation has been complete: he has discovered, beyond all possibility of contradiction, a fact which is uniform through the whole extent of the solar system; namely, that every body, nay that every particle in it, is continually deflected towards every other body; and that this deflection is, in every instance, proportional to the quantity of matter in that body towards which the deflection is directed, and to the reciprocal of the square of the distance from it. He has therefore discovered a physical law of immense extent. Nor has he been less successful in the explanation of particular phenomena. Of this there cannot be given a better instance than the explanation of the lunar motions from the theory of gravity begun by Newton, Mathesi sua facem præferente; and now brought to such a degree of perfection, that if the moon's place be computed from it for any moment within the period of 2000 years back, it will not be found to differ from the place on which she was actually observed by the 100th part of her own breadth.

We may challenge the Aristotelians to name any one cause which has really been discovered by their great master, whether in the operations of mind or of body. They must not adduce the investigation of any natural law in which he has sometimes succeeded. With still greater confidence may we challenge them to produce any remarkable instance of the explanation of natural phenomena either of mind or body. By explanation, we mean an account of the production, and an appreciation of all the circumstances, susceptible of a scrupulous comparison with fact, and perfectly consistent with it. It is here that the weakness of this philosopher's hypothesis is most conspicuous; and his followers acknowledge, that, in the enquiries which proceed by experiment, they have not derived great assistance from Aristotle's philosophy. But this, say they, does not derogate from the pre-eminence of his philosophy, because he has shown that the particular fields of observation are to be cultivated only by means of experiment. But surely every field of observation is particular. There is no abstract object of philosophical research, the study of which shall terminate in the philosophy of universals. There is therefore great room for suspecting that Aristotle and his followers have not aimed at the discovery of causes, but only at the discovery of natural laws, and have failed in the attempt.

Into the previous question, Is it possible to discover a philosophical cause, that something which is neither the prior nor the posterior of the two immediately adjoining events, but their bond of union and this distinct from the union itself? we are not disposed to enter at length.

Much has been written on this subject. The most acute observation and sound judgment have been employed in the study: but, in all these researches, no phenomena have occurred which look like the perception or contemplation of a philosophical cause, or this power in abstracto. No philosopher has ever pretended to state such an object of the mind's observation. Those causes, those bonds of necessary union between the naturally conjoined events or objects, are not only perceived by means of the events alone, but are perceived solely in the events, and cannot be distinguished from the conjunctions themselves. They are neither the objects of separate observation, nor the productions of memory, nor inferences drawn from reflection on the laws by which the operations of our own minds are regulated; nor can they be derived from other perceptions in the way of argumentative inference. We cannot infer the paroxysm of terror from the appearance of impending destruction, nor the fall of a stone when not supported, as we infer the incommensurability of the diagonal and side of a square. This last is implied in the very conception or notion of a square; not as a consequence of its other properties, but as one of its essential attributes: and the contrary proposition is not only false, but incapable of being distinctly conceived. This is not the case with the other phenomenon, nor any matter of fact. The proofs which are brought of a mathematical proposition are not the reason of its being true, but the steps by which this truth is brought into our view; and frequently, as in the instance now given, this truth is perceived, not directly, but consequentially, by the inconceivableness of the contrary proposition.

Hume derives this irresistible expectation of events from the known effect of custom, and the association of ideas; an explanation which begs the very thing to be proved, when it ascribes to custom a power of any kind. Besides, on the genuine principles of scepticism, this custom involves an acknowledgment of past events, of a something different from present impressions, which, in this doctrine, are the only certain existences in nature.

Leibnitz and Malebranche deny that there is any such connexion, and assert that the events of the universe go on in corresponding trains, but without any causal connexion, just as a well regulated clock will keep time with the motions of the heavens without any kind of dependence on them; that this harmony of events was pre-

established by the Author of the Universe, in subserviency to the purposes he had in view in its formation, &c. But, without insisting on the fantastic wildness of this ingenious whim, it is enough to observe that it also is a begging of the question, because it supposes causation when it ascribes all to the agency of the Deity.

That we do perceive the relation of causation as distinct from all others, and in particular as distinct from the relation of contiguity in time and place—or the relation of agent, action, and patient, must be concluded from the uniformity of language, which never confounds them except on purpose, and when it is perceived. But even here we shall find that none of the terms used for expressing those powers of substance, which are conceived as the causes of their characteristic phenomena, really express any thing different from the phenomena themselves. Let any person try to define the terms gravity, elasticity, sensibility, and the like, and he will find that the definition is nothing but a description of the phenomenon itself. The words are all derivatives, most of them verbal derivatives, implying action, gravitation, &c. As the general resemblances in shape, color, &c., are expressed by the natural historian by generic terms, so the general resemblances in event are expressed by the philosopher in generic propositions, which, in the progress of cultivation, are also abbreviated into generic terms. This abundantly explains the consistency of our language on this subject, both with itself, and with the operations of nature, without however affording any argument for the truth of the assumption, that causes are the objects of philosophic research as separate existences; or that this supposed necessary connexion is a necessary truth, whether supreme or subordinate. But since the perception of it has its foundation in the constitution of the human mind, it seems entitled to the name of a first principle. We are hardly allowed to doubt of this when we consider the importance of it, and the care of nature to secure us, in all things essential to our safety and well-being, from all danger, from inattention, ignorance, or indolence, by an instinct infallible in its information, and instantaneous in its decisions.

Causes, therefore, say some of our ablest writers on this subject, are no more cogniscible by our intellectual powers than colors by a man born blind: nay, whoever will be at the pains to consider this matter will find that necessary connexion, or bond of causation, can no more be the subject of philosophical discussion by man than the ultimate nature of truth. It is precisely the same absurdity or congruity as to propose to examine light with a microscope. All that we can say is that their existence is probable, but by no means certain. But all this is indifferent to the real occupation of the philosopher, and does not affect either the certainty, the extent, or the utility of the knowledge which he may acquire.

We are now able to appreciate the high pretensions of the philosophy of lord Bacon, and its claim to scientific superiority. The true object of the philosopher is not causes: his discoveries are nothing but the discovery of general facts and physical laws; and his employment is the same with that of the descriptive historian. He observes and describes with care and accuracy the events of nature; and then he groups them into classes, from resembling circumstances detected in the midst of many others which are dissimilar and occasional. By gradually throwing out more circumstances of resemblance, he renders his classes more extensive; by carefully marking those circumstances in which the resemblance is observed, he characterises all the different classes; and by a comparison of these with each other, in respect to the number of resembling circumstances, he distributes his classes according to their generality and subordination: thus exhausting the whole assemblage, and leaving nothing unarranged but accidental varieties. In this procedure every grouping of similar events is, ipso facto, discovering a physical law; and the expression of this assemblage is the expression of that law. And, as every observation of this constancy of fact affords an opportunity for exerting the instinctive inference of natural connexion between the related subjects, every such observation is the discovery of a power, property, or quality, of natural substance. This observation of event is all we know of the connexion, all we know of the natural power. When the philosopher proceeds further to the arrangement of events, according to their various degrees of complication, he is making an arrangement of all natural powers according to their various degrees of subordinate influence. And thus his occupation is similar to that of the descriptive historian, classification and arrangement; and this seems to constitute all the science attainable by both.

Sect. III.—The Philosophy and Rules of Kepler, Sir Isaac Newton, &c.

In the above view philosophy may be defined the study of the phenomena of the universe, to discover the general laws which indicate the powers of natural substances, to explain subordinate phenomena, and to improve art: or philosophy is the study of the phenomena of the universe, with a view to discover their causes, to explain subordinate phenomena, and to improve art. The task is undoubtedly difficult, and will exercise our noblest powers. The employment is manly, and the result important. It therefore justly merits the appellation of philosophy, although its objects are nowise different from those which occupy the attention of other men.

A philosophical history of nature consists in a complete or copious enumeration and narration of facts, properly selected, cleared of all extraneous circumstances, and accurately narrated. This constitutes the materials of philosophy. We cannot give a better example of this branch of philosophical occupation than astronomy. From the beginning of the Alexandrian school to this day astronomers have been at immense pains in observing the heavenly bodies, to detect their true motions. This has been a work of prodigious difficulty: for the appearances are such as might have been exhibited although the real motion had been extremely different. Not that our senses give us false information; but we hasty, and frequently false judgments, from t

informations; and call those things deceptions of sense, which are in fact errors of judgment. But the true motions have at last been discovered, and described with such accuracy that the history may be considered as nearly complete. This is to be found in the usual systems of astronomy, where the tables contain a most accurate and synoptical account of the motion; so that we can tell with precision in what point of the heavens a planet has been seen at any instant that can be named. Sir Isaac Newton's Optics is such another perfect model of philosophical history, as far as it goes. This part of philosophy may be called phenomenology.

A general knowledge of the universe may thus be easily acquired and firmly retained, by classification and arrangement; which must proceed on resemblances observed in the events; the subsequent arrangement must be regulated by the distinctions of which those resemblances are still susceptible. This assemblage of events into groups must be expressed. They are facts; therefore the expression must be in propositions, which form, taken together, natural or physical laws.

This observation of physical laws is always accompanied by a reference of that uniformity of event to a natural bond of union between the concomitant facts, which is conceived by us as the cause of this concomitancy; and therefore this procedure of the philosopher is considered as the discovery of those causes, or powers of natural substances, which constitute their physical relations, and may justly be called their distinguishing qualities or properties. This view of the matter gives rise to a new nomenclature. We give to those powers generic names, such as sensibility, intelligence, irritability, gravity, elasticity, fluidity, magnetism, &c. These terms mark resembling circumstances of events; and no other definition can be given of them but a description of these circumstances. In a few cases which have been the subjects of more painful or refined discussion, we have proceeded farther in this abbreviation of language. Want of attention to the pure meaning of the words thus originated, has frequently occasioned very great mistakes in philosophical science. We shall give an instance of its most successful application to the class of events already adduced.

Kepler, the celebrated Prussian astronomer, having maturely considered the phenomena recorded in the tables and observations of his predecessors, discovered, amidst all the varieties of the planetary motions, three circumstances of resemblance, which are now known by the name of Kepler's laws. See Astronomy, Index; and Kepler. Long after this discovery of Kepler, Sir Isaac Newton found that these laws of Kepler were only particular cases of a fact or law still more general. He found that the deflections of the planets from uniform rectilineal motion were all directed to the sun; and that the simultaneous deflections were inversely proportional to the squares of the distances from him. Thus was established a physical law of vast extent; but further observation showed him, that the motion of every body of the solar system was compounded of an original motion of projection, combined with a deflection towards every other body; and that the simultaneous deflections were proportional to the quantity of matter in the body towards which they were directed, and to the reciprocal of the square of the distance from it. Thus was the law made still more general. He compared the deflection of the moon in her orbit with the simultaneous deflection of a stone thrown from the hand, and describing a parabola; and he found that they followed the same law, that is, that the deflection of the moon in a second was to that of the stone in the same time as the square of the stone's distance from the centre of the earth to the square of the moon's distance from it. Hence he concluded that the deflection of a stone from a straight line was just a particular instance of the deflections which took place through the whole solar system.

The deflection of a stone is one of the indications it gives of its being heavy; whence he calls it gravitation. He therefore expresses the physical law which obtains through the whole solar system, by saying that 'every body gravitates to every other body; and the gravitations are proportional to the quantity of matter in that other body, and inversely proportional to the square of the distance from it.' Thus we see how the arrangement of the celestial phenomena terminated in the discovery of physical laws; and that the expression of this arrangement is the law itself. Since the fall of a heavy body is one instance of the physical law, and since this fall is considered by all as the effect of its weight, and this weight is considered as the cause of the fall, the same cause is assigned for all the deflections observed in the solar system; and all the matter in it is found to be under the influence of this cause, or to be heavy; and thus his doctrine has been denominated the system of universal gravitation. Philosophers have gone farther, and have supposed that gravity is a power, property, or quality, residing in all the bodies of the solar system. Sir Isaac Newton does not say so. He contents himself with the immediate consequence of the first axiom in natural philosophy, viz. that every body remains in a state of rest, or of uniform rectilineal motion, unless affected by some moving force. Since the bodies of the solar system are neither in a state of rest, nor of uniform rectilineal motion, they must be considered as so affected; that is, that there operates on every one of them a moving force, directed towards all the others, and having the proportions observed in the deflection.

It is to our present purpose to show how the observation and arrangement of phenomena terminate in the discovery of their causes, or of the powers or properties of natural substances. This is a task of great difficulty, as it is of great importance. Of this difficulty there are two chief causes:

1. In most of the spontaneous phenomena of nature there is a complication of many events, and some of them escape our observation. Attending only to the most remarkable, we conjoin these only in our imagination, and are apt to think these the concomitant events in nature, the proper indication of the cause, and the subjects of this philosophical relation, and to suppose that

they are always conjoined by nature. Thus it was thought that there resideth in a vibrating chord a power by which the sensation of sound was excited, or that a chord had a sounding quality. But late observations have shown clearly that there is an inconceivable number of events interposed between the vibration of the chord and the sensitive affection of our ear; and, therefore, that sound is not the effect of the vibration of the chord, but of the very last event of this series: and this is completely demonstrated by showing that the vibration and the sound are not necessarily connected, because they are not always connected, but require the interposition of air or of some other elastic body. These observations show the necessity of the most accurate and minute observations of the phenomena, that none of those intermediate events may escape us, and we be thus exposed to the chance of imaginary connexions between events which are far asunder in the procedure of nature. As the study has improved, mistakes of this kind have been corrected; and philosophers are careful to make their trains of events under one name as short as possible. Thus, in medicine, a drug is no longer considered as a specific remedy for the disease which is sometimes cured when it has been used, but is denominated by its most immediate operation on the animal frame: it is no longer called a febrifuge, but a sudorific.

2. When many natural powers combine their influence in a spontaneous phenomenon of nature, it is frequently very difficult to discover what part of the complicated effect is the effect of each, and to state those circumstances of similarity which are the foundation of a physical law, or entitle us to infer the agency of any natural power. The most likely method for insuring success in such cases is to get rid of this complication of events, by putting the subject into such a situation that the operation of all the known powers of nature shall be suspended, or so modified as we may perfectly understand their effects. We can thus appreciate the effects of such as we could neither modify nor suspend, or we can discover the existence of a new law, the operation of a new power. This is called making an experiment; and is the most effectual way of advancing in the knowledge of nature, and has been called experimental philosophy. See Sect. 5.

It seems, however, at first sight, in direct opposition to the procedure of nature in forming general laws. These are formed by induction from multitudes of individual facts, and must be affirmed to no greater extent than the induction on which they are founded. Yet it is a matter of fact, a physical law of human thought, that one simple, clear, and unequivocal experiment gives us the most complete confidence in the truth of a general conclusion from it to every similar case. Whence this anomaly? It is not an anomaly or contradiction of the general maxim of philosophical investigation, but the most refined application of it. There is no law more general than this, that 'Nature is constant in all her operations.' The judicious and simple form of our experiment insures us (we imagine) in the complete knowledge of all the circumstances of the event. Upon this supposition, and this alone, we consider the experiment as the faithful representative of every possible case of the conjunction.

The last branch of philosophic occupation is the explanation of subordinate phenomena. This is nothing more than the referring any particular phenomenon to that class in which it is included; or pointing out the general law, or that general fact, of which the phenomenon is a particular instance.* Thus the feeling of the obligations of virtue is thought to be explained, when it is shown to be a particular case of that regard which every person has for his dearest interests. The rise of water in pumps is explained, when we show it to be a particular case of the pressure of fluids, or of the air. The general law under which we show it to be properly arranged is called the *principle* of the explanation, and the explanation itself is called the *theory* of the phenomenon. Thus Euler's explanation of the lunar irregularities is called the theory of the lunar motions on the principle of gravitation. This may be done either to advance our own knowledge of nature, or to communicate it to others. If done with the first view, we must examine the phenomenon minutely, and endeavour to detect every circumstance in it, and thus discover all the known laws of nature which concur in its production; we then appreciate the operation of each according to the circumstances of its exertion; we then combine all these, and compare the result with the phenomenon. If they are similar, we have explained the phenomenon. We cannot give a better example than Franklin's explanation of the phenomena of thunder and lightning.

'If we explain a phenomenon from known principles, we proceed synthetically from the general law already established, and known to exert its influence in the present instance. We state this influence both in kind and degree according to the circumstances of the case; and, having combined them, we compare the result with the phenomenon, and show their agreement. Thus, because all the bodies of the solar system mutually gravitate, the moon gravitates to the sun as well as to the earth, and is continually, and in a certain determinate manner, deflected from that path which she would describe did she gravitate only to the earth. Her motion round the earth will be retarded during the first and third quarters of her orbit, and accelerated during the second and fourth. Her orbit and her period will be increased during our winter, and diminished during our summer. Her apogee will advance, and her nodes will recede; and the inclination of her orbit will be greatest when the nodes are in syzigee, and least when they are in quadrature. And all these variations will be in certain precise degrees. Then we show that all these things actually obtain in the lunar motions, and they are considered as explained. This summary account of the object and employment in all philosophical discussion is sufficient for pointing out its place in the circle of the sciences, and will serve to direct us to the proper methods of prosecuting it with success. Events are its object; and they are

considered as connected with each other by causation, which may therefore be called the philosophical relation of things. The following may be adopted as the fundamental proposition on which all philosophical discussion proceeds, and under which every philosophical discussion or discovery may be arranged:—Every change that we observe in the state or condition of things is considered by us as an effect, indicating the agency, characterising the kind, and determining the degree of its inferred cause.'

What have the philosophers of all ages been employed about, but the discovery of the causes of those changes that are incessantly going on? Human curiosity has been directed to nothing so powerfully and so constantly as to this. Many absurd causes have been assigned for the phenomena of the universe; but no set of men have ever said that they happened without a cause. This is so repugnant to all our propensities and instincts, that even the atheistical sect, who, of all others, would have profited most by the doctrine, have never thought of advancing it. To avoid so shocking an absurdity, they have rather allowed that chance, and the concourse of atoms, are the causes of the beautiful arrangements of nature. The thoughtless vulgar are no less solicitous than the philosophers to discover the causes of things. Had men never speculated, their conduct alone gives sufficient evidence of the universality of the opinion. The whole conduct of man is regulated by it, nay almost wholly proceeds upon it, in the most important matters, and where experience seems to leave us in doubt; and to act otherwise, as if any thing whatever happened without a cause, would be a declaration of insanity. Dr. Reid has beautifully illustrated this truth, by observing, that even a child will laugh at you if you try to persuade him that the top, which he misses from the place where he left it, was taken away by nobody. You may persuade him that it was taken away by a fairy or a spirit, but he believes no more about this nobody, than the master of the house, when he is told that nobody was the author of a piece of theft or mischief. What opinion would be formed, says Dr. Reid, of the intellects of the juryman, on a trial for murder by persons unknown, who should say that the fractured skull, the watch and money gone, and other like circumstances, might possibly have no cause? he would be pronounced insane or corrupted.

The rules of philosophising which Newton premises to his account of the planetary motions, which he so scrupulously followed, and with a success which gives them great authority, are all in strict conformity to the view we have now given of the subject. The chief rule is, that similar causes are to be assigned to similar phenomena. This is indeed the source of all our knowledge of connected nature; and without it the universe would only present to us an incomprehensible chaos. It is by no means, however, necessary to enjoin this as a maxim for our procedure: it is an instinctive propensity of the human mind. It is absolutely necessary, on the contrary, to caution us in the application of this propensity. We must be extremely confident in the certainty of the resemblance before we venture to make any inference. We are prone to reason from analogy; the very employment is agreeable; and we are ever disposed to embrace opportunities of engaging in it. For this reason we are satisfied with very slight resemblances, and eagerly run over the consequences, as if the resemblances were complete; and thus our researches frequently terminate in falsehood.

This propensity to analogical reasoning is aided by another equally strong, and equally useful, when properly directed; we mean the propensity to form general laws: it is in fact a propensity to discover causes, which is equivalent to the establishing of general laws. It appears in another form, and is called a love of, or taste for, simplicity; and this is encouraged or justified, as agreeable to the uniformity and simplicity of nature. 'Natura semper sibi est similis et consona,' says Newton: 'Frustra fit per plura quod fieri potest per pauciora,' says another. The beautiful, the wise economy of nature, are phrases in every body's mouth; and Newton enjoins us to adopt no more causes than are sufficient to explain the phenomena. All this is very well, and is true in its own degree; but it is too frequently the subterfuge of human vanity and self-love. This inordinate admiration of the economy and simplicity of nature is generally enjoined with a manifest love of system, and with the actual production of some new system, where, from one general principle, some extensive theory or explanation is deduced or offered to the world. The author sees a sort of resemblance between a certain series of phenomena and the consequences of some principle, and thinks the principle adequate to their explanation. Then, on the authority of the acknowledged simplicity of nature, he roundly excludes all other principles of explanation; because, says he, this principle is sufficient, et frustra fit per plura, &c. We could point out many instances of this kind in the writings of perhaps the first mathematician, and the poorest philosopher of the last century; where extensive theories are thus cavalierly exhibited, which a few years examination have shown to be nothing but analogies, indistinctly observed, and, what is worse, inaccurately applied.

To regulate these hazardous propensities, and keep philosophers in the right path, Newton inculcates another rule, or rather gives a modification of this injunction of simplicity. He enjoins that 'no causes shall be admitted but such as are true, and sufficient to account for the phenomena.' See our article Newtonian Philosophy, § 6. The meaning of this rule has been mistaken by many philosophers, who imagine that by true he means causes which really exist in nature, and are not mere creatures of the imagination. We have met with some who would boggle at the doctrines of Aristotle respecting the planetary motions, viz. that they are carried along by conducting intelligent minds, because we know of none such in the universe; and who would nevertheless think the doctrine of the Cartesian vortices deserving of at least an examination, because we see such vortices exist, and produce effects which have some resem-

blance to the planetary motions, and have justly rejected them, solely because this resemblance has been very imperfect. We apprehend Newton's meaning is, that no cause of any event shall be admitted, or even considered, which we do not know to be actually concurring or exerting some influence in that very event. If this be his meaning he would reject the Cartesian vortices, and the conducting spirits of Aristotle for one and the same reason; not because they were not adequate to the explanation, nor because such causes did not exist in nature, but because we did not see them any how concerned in the phenomenon under consideration. We neither see a spirit nor a vortex, and therefore need not trouble ourselves with enquiring what effects they would produce. This was his conduct, and has distinguished him from all philosophers who preceded him, though many, by following his example, have been rewarded by similar success. This has procured to Newton the character of the modest philosopher; and modest his procedure may be called, because the contrary procedure of others did not originate so much from ignorance as from vanity. Newton's conductor in this was not modesty, but sagacity, prudence, caution, and, in a word, sound judgment.

For the bonds of nature the supposed philosophical causes are not *observed;* they are *inferred* from the phenomena. When two substances are observed, and only when they are observed, to be connected in any series of events, we infer that they are connected by a natural power; but when one of the substances is not seen but fancied, no law of human thought produces any inference whatever. For this reason, Newton stopped short at the last fact which he could discover in the solar system, that all bodies were deflected to all other bodies, according to certain regulations of distance and quantity of matter. When told that he had done nothing in philosophy, that he had discovered no cause, and that to merit any praise he must show how this deflection was produced: he said that he knew no more than he had told them; that he saw nothing causing this deflection; and was contented with having described it so exactly that a good mathematician could now make tables of the planetary motions as accurate as he pleased, and with hoping, in a few years, to have every purpose of navigation and of philosophical curiosity completely answered. He was not disappointed. When philosophers were contriving hypothetical fluids, and vortices, which would produce these deflections, he contented himself with showing the total inconsistency of these explanations with the mechanical principles acknowledged by their authors; and that their causes were neither real, nor sufficient for explaining the phenomenon. A cause is sufficient for explaining a phenomenon only when its legitimate consequences are perfectly agreeable to these phenomena. Newton's discoveries remain without diminution or change: no philosopher has yet advanced a step further. But let not the authority, or even the success of Newton be our guide, farther than they are supported by experiment. If philosophy be only the interpretation of nature's language, the inference of causes from the phenomena, a fancied or hypothetical phenomenon can produce nothing but a fanciful cause, and can make no addition to our knowledge of real nature.

'It is in experimental philosophy alone that hypotheses can have any just claim to admission; and here they are not admitted as explanations, but as conjectures serving to direct our line of experiments. Effects only appear; and by their appearance, and the previous information of exexperience, causes are immediately ascertained by the perfect similarity of the whole train of events to other trains formerly observed. Or they are suggested by more imperfect resemblances of the phenomena; and these suggestions are made with stronger or fainter evidence, according as the resemblance is more or less perfect. These suggestions do not amount to a confidential inference, but only raise a conjecture. Wishing to verify or overturn this conjecture, we have recourse to experiment, and we put the subject under consideration in such a situation that we can say what will be the effect of the conjectural cause if real. In this way conjectures have their use, and are the ordinary means by which experimental philosophy is improved. But conjectural systems are worse than nonsense, filling the mind with false notions of nature, and generally leading us into a course of improper conduct, when they become principles of action. This is acknowledged even by the abettors of hypothetical systems themselves, when employed in overturning those of their predecessors, and establishing their own; witness the successive maintainers of the many hypothetical systems in medicine, which have had their shortlived course within these last two centuries. Let every person, therefore, who calls himself a philosopher, resolutely determine to reject all temptations to this kind of system-making, and let him never consider any composition of this kind as any thing better than the amusement of an idle hour.'

Sect. IV.—Of the Synthetic Mode of Prosecuting Philosophical Investigations.

The sphere of our intuitive knowledge is very limited; we must be indebted for the greatest part of our intellectual attainments to our rational powers, and it must be deductive. In the spontaneous phenomena of nature, whether of mind or body, it seldom happens that the energy of that natural power which is the principle of explanation is so immediately connected with the phenomenon that we see the connexion at once. Its exertions are frequently concealed, and in all cases modified, by the joint exertions of other natural powers; the particular exertion of each must be considered apart, and their mutual connexion traced out. It is only in this way that we can discover the train of intermediate operations, and see in what manner and degree the real principle of explanation concurs in the ostensible process of nature.

'In all such cases it is evident that our investigation must proceed by steps, conducted by the sure hand of logical method. To take an in-

stance, let us listen to Galileo, while he is teaching his friends the cause of the rise of water in a pump. He says that it is owing to the pressure of the air. This is his principle; and he announces it in all its extent. 'All matter, says he, is heavy, and in particular air is heavy. He then points out the connexion of this general principle with the phenomenon.

'The rise of the water in the pump is shown to be a particular case of the general fact in hydrostatics, that fluids in communicating vessels will stand at heights which are inversely as their densities, or that columns of equal weights are in equilibrio.

'This way of proceeding is called arguing à priori, or the synthetic method. It is founded on just principles; and the great progress made in the mathematical sciences, by this mode of reasoning, shows to what length it may be carried with irresistible evidence. It has long been considered as the only inlet to true knowledge; and nothing was allowed to be known with certainty which could not be demonstrated in this way to be true. Accordingly logic, or the art of reasoning, was nothing but a set of rules for successfully conducting this argument.

'Under the direction of this infallible guide, philosophy has made sure progress towards perfection. The explanation of an appearance in nature is nothing but the arrangement of it into that general class in which it is comprehended. The class has its distinguishing mark, which, when it is found in the phenomenon, fixes it in its class, there to remain for ever an addition to our stock of knowledge. Nothing can be lost any other way but by forgetting it; and the doctrines of philosophers become stable as the laws of nature.'

The Aristotelian logic, the syllogistic art, that art so much boasted of, as the only inlet to true knowledge, the only means of discovery, was in direct opposition to the procedure of nature, by which we acquire knowledge and discover truth. The ancient logic supposed that all the first principles are already known, and that nothing is wanted but the application of them to particular facts. But, were this true, the application of them can hardly be called a discovery; but it is false, and the fact is that the first principles are generally the chief objects of our research, and that they have come into view only now and then as it were by accident, and never by the labors of the logician. But curiosity was awakened, and men of genius were fretted as well as disgusted with the disquisitions of the schools, which one moment raised expectations by the symmetry of composition, and the next moment blasted them by their inconsistency with experience. They saw that the best way was to begin anew, to throw away the first principles altogether, without exception, and endeavour to find out new ones, which should in every case be agreeable to fact. 'Philosophers began to reflect that under the unnoticed tuition of nature men had acquired much useful knowledge. The exercise of the inductive principle, by which nature prompts us to infer general laws from the observation of particular facts, gives a species of logic new in the schools, but old as human nature. It is a just and rational logic; for it is founded on, and indeed is the only habitual appellation of, this maxim, 'That whatever is true with respect to every individual of a class of events is true of the whole class.' This is just the inverse of the maxim on which the Aristotelian logic proceeded.

This has given a new turn to the whole track of philosophical investigation. To discover first principles we must make extensive and accurate observations, so as to have copious inductions of facts, that we may not be deceived as to the extent of the principle inferred from them. We must extend our acquaintance with the phenomena, paying a minute attention to what is going on all around us; and we must study nature, not shut up in our closet, drawing the picture from our own fancy, but in the world, copying our lines from her own features. To delineate human nature we must see how men act. To give the philosophy of the material world we must notice its phenomena. This method of studying nature has been prosecuted during these last two centuries with great eagerness and success. Philosophers have made accurate observations of facts, and copious collections of them. Men of genius have discovered many general powers both of mind and body; and resemblances among these have suggested powers still more general. By these efforts investigation became familiar; hypotheses were banished, and nothing was admitted as a principle which was not inferred from the most evident inductions. Conclusions from such principles became every day more conformable to experience. Mistakes sometimes happened; but, recourse being had to more accurate observation or more certain induction, the mistakes were corrected. In the present study of nature, our steps are more slow, hesitating, and painful; our conclusions are more limited and modest; but our discoveries are more certain and progressive, and the results are more applicable to the purposes of life. This pre-eminence of modern philosophy over the ancient is seen in every path of enquiry. It was first remarkable in the study of the material world; and there it still continues to be most conspicuous. But it is no less to be seen in the later enquiries of philosophers in metaphysics and ethics, where the mode of investigation by analysis and experiment has been greatly adopted; and this has restored philosophers to the world and to society. They are no longer to be found only in the academies of the sophists and the cloisters of the convent, but in the discharge of public and private duty.

Not to expatiate on the great variety of corporeal pleasures, which the present state of human existence affords, man has improved this anxious desire of the knowledge of the objects around him, so as to derive from them not only the means of subsistence and comfort, but the most elegant and pleasing of all gratifications, the accumulation of intellectual knowledge, independent of all consideration of its advantages. 'It is therefore not only lawful but highly commendable, in such as possess the means of intellectual improvement, without relinquishing the indispensable social duties, to push this advantage as far

as it will go: and in all ages and countries it has been considered as forming the best and highest distinction between man and man.

Sect. V.—Of Experimental Philosophy.

Experimental philosophy is that which has its foundation in experience, wherein nothing is assumed as a truth but what is founded upon ocular demonstration, or which cannot be denied without violating the common sense and perceptions of mankind. It proceeds entirely on experiments; deduces the laws of nature, and the powers and properties of bodies, with their effects on each other, from experiments and observations.

Philosophers in former times, when reasoning upon the appearances and operations of nature, instead of following this method, assumed such principles as they imagined sufficient for explaining the phenomena. Hence for a great number of ages experiment was abandoned; no progress was made in science; but systems were heaped upon systems, having neither consistency with one another nor with themselves.

The first who deviated from this method of philosophising was the celebrated Roger Bacon, who lived in the thirteenth century, and who is said to have spent £2000 (an immense sum in those days) in making experiments. The admirable Crichton, who flourished about the year 1580, not only disputed against the philosophy of Aristotle, which had for so long been in vogue, but wrote a book against it. Contemporary with this celebrated person was Francis lord Bacon, to whom we have so largely referred, and who was in truth the founder of the experimental philosophy of modern times. In this luminous path followed sir Isaac Newton; but, unfortunately, neither Bacon nor Newton had an opportunity of becoming acquainted with many important facts which have since been brought to light. Their experimental philosophy was merely mechanical, or derived from the visible operations of solid bodies, or of the grosser fluids. A remarkable instance of the errors into which they were thus betrayed we have in the doctrine of projectiles, in which the most enormous deviations from truth were sanctified by the greatest names in the seventeenth century, merely by reasoning from the resistance of the air to bodies moving slowly and visibly, to its resistence to the same bodies when moved with high degrees of velocity. See Projectiles. In other cases they were reduced to make use of words to express immechanical powers, as attraction, repulsion, refraction, &c., which have since tended in no small degree to embarrass and confound science by the disputes that have taken place concerning them.

The great foundations of the present system of experimental philosophy may be thus exhibited:

1. All the material substances of which the universe is composed are called natural bodies. What we perceive uniform and invariable in these substances we call their properties. Some of these are general and common to all matter, as *extension;* others are proper to particular substances, as for instance *fluidity;* while some appear to be compounded of the general and particular properties, and thus belong to a still smaller number; as the properties of air, which are derived from the general property of extension, combined with fluidity, elasticity, &c.

2. In taking a particular review of the properties of bodies we naturally begin with that of *extension.* This manifests itself in the three dimensions of length, breadth, and thickness. Hence proceeds the divisibility of matter, which our modern system supposes to reach even to infinity; but, though this proposition be supported by mathematical demonstrations, it is impossible we can either have any distinct idea of it, or of the opposite doctrine, which teaches that matter is composed of excessively minute particles called atoms, which cannot be divided into smaller ones. The subtilty indeed to which solid bodies may be reduced by mechanical means is surprising; and in some cases is so great, that we might be tempted to suppose that a farther division is impossible. Thus, in grinding a speculum, the inequalities of its surface are so effectually worn off, that the whole becomes in a certain degree invisible, showing not itself by the light which falls upon it, but the image of other bodies; but the smallest scratch which disturbs the equality of the surface is at once distinctly visible.

3. From the arrangement of these ultimate particles of matter, whatever we suppose them to be, arises the various figures of bodies: and hence figure is a property of all bodies no less universal than extension, unless we speak of the ultimate particles of matter, which, as they are supposed to be destitute of parts, must consequently be equally destitute of figure; and the same consequence will follow whether we adopt this supposition or the other. The figures of bodies are so extremely various and dissimilar that it is impossible to find any two perfectly alike. In most indeed the dissimilarity may be perceived by the naked eye; but the microscope quickly discovers new varieties of figure, and the imbecility of our senses in this respect. Solidity is another property essential to all matter. By this we mean that property which one quantity of matter has of excluding all other from the space which itself occupies at that time. Hence arises what we call *resistance,* which is always an indication of solidity; and no less so in those bodies which we call fluid than in those which are the most solid. This may at first seem to be a contradiction; but fluids yield only when they can get away from the pressure; in all other cases they resist as violently as the most solid bodies. Thus water confined in a tube will as effectually resist the impression of a piston thrust down upon it as though it were the most solid substance.

4. The distance of the parts of bodies from each other is called their *porosity,* and was formerly supposed to be owing to a vacuum interspersed between them; it is now chiefly regarded in a comparative point of view. The porosity of bodies with regard to one another, may be thus explained:—Wood, or a sponge, is porous with regard to water; but water itself is porous with regard to air, which it absorbs in considerable quantity. Both air and water again are po-

rous with regard to heat, which produces very considerable changes upon them, according to the quantity of it they contain, or the manner it acts in their pores. Vacuities of this kind indeed are supposed to be absolutely necessary to motion: for though we may say, matter being divisible almost ad infinitum, that a body or substance more solid may move in another substance that is more subtle, and that will give way to its motion, we must nevertheless have recourse to a last resort, and admit of an ultimate vacuum, which will give room sufficient to the least corpuscle, that its part A may take the place of its part B without the least resistance; besides, it is not to be imagined that nature, in fact, admits of that infinite divisibility which our imagination can conceive, and that every thing, which is possible in idea, is at all times practicable. All that exists is possible, but all that is possible does not however exist. By *density* is understood the proportion between the extension and solidity of a body; one body, therefore, is more dense than another, when, under the same degree of extension, it contains more solid matter: and this quality arises from condensation and compression. *Elasticity* is nothing more than that effort by which certain bodies, when compressed, endeavour to restore themselves to their former state; and this property supposes them compressible. As all these natural properties of bodies are of great utility in explaining the principles of physics, and in applying them to all the arts, experimental philosophy proves their reality by a thousand examples.

5. We discover still other properties in bodies; such as *mobility*, which we must not here confound with motion: for mobility arises from certain dispositions which are not in an equal degree in all bodies; whence it comes that some are more easily moved than others: and this proceeds from the resistance to motion which is perceived in all bodies having regard merely to their masses; and this resistance is called vis inertiæ, or inert force. A body is said to be in motion when it is actually moving from one place to another; or whenever a body changes its situation with regard to the objects that surround it, either nearly or remotely, it is said to be in motion. There are three principal matters to be considered in a moving body: its direction, its velocity, and the quantity of its motion; and here physics explain the force of moving power; they likewise distinguish between simple and compound motion. Simple motion is that which arises from only one force, or which tends to only one point. It describes the laws, and explains the resistance of mediums; the resistance of friction; the difficulties of a perpetual motion; the alteration of direction occasioned by the opposition of a fluid matter; reflected or reverberated motion; the communication of motion by the shock of bodies, &c. Compound motion is that of a body impelled to move by several causes or powers which act according to their different directions. Physics here likewise investigates the laws of motion; and is particularly applied to the explaining, under this head, what are called the central forces, which produce a motion that is either circular or in a curve line, and which incessantly urge the moving body either to approach or recede from the centre. To distinguish these from each other, the former is called the centripetal force, and the latter the centrifugal force.

6. The powers of *attraction* and *repulsion* seem to be common to all matter, and the component parts of all substances are kept in their places by the due balance of these opposite powers. If, by any means, the particles of any substance be removed beyond their sphere of mutual attraction, they repel one another, as those of water when it becomes steam. Of the different kinds of attraction, that of *gravitation* seems to extend to the greatest possible distance; but that which keeps together the parts of the same substance, thence called the attraction of cohesion, and the different kinds of chemical attractions called affinities, only act at a small distance. Of the causes of these attractions we are entirely ignorant. See ATTRACTION, AND ELECTRICITY.

7. By *gravity*, or *ponderosity*, is to be understood that force which occasions bodies to pass from a higher to a lower place, when nothing opposes their course, or when the obstacles are not sufficient to stop them. Speculative philosophy investigates its cause, and perhaps in vain. Experimental philosophy contents itself with describing the phenomena, and teaching the laws of gravity, which are thoroughly established by a thousand reiterated experiments. In order properly to understand this subject, we must take care not to confound the term gravity with that of weight. By the former we understand that force which urges bodies to descend through a certain space in a given time. By the latter is meant the quantity of a heavy body that is contained under the same bulk. The phenomena are explained by the experiments themselves, and by inferences deduced from them. *Hydrostatics* is a science of which the object is the gravity and equilibrium of fluids in particular. Though the gravity of these bodies is the same with that of others, and is subject to the same laws, yet their state of fluidity gives rise to particular phenomena, which it is of consequence to know. But, as hydrostatics cannot be successfully treated on without the assistance of calculation, it has been ranked among the mathematical sciences. See HYDROSTATICS. We say the same with regard to *mechanics*, which is the art of employing, by the aid of machines, the motion of bodies, in conformity to its properties and laws, as well with regard to solids as fluids, either more commodiously or more advantageously.

After it has made the most accurate experiments and observations on the general properties of bodies, experimental philosophy passes to the examination of the air, water, heat, light, colors, &c. The air is a fluid with which we are surrounded from the instant of our birth, and without which we cannot exist. It is by the properties and the influences of the air, that nature gives increase and perfection to all that it produces for our wants and conveniencies; it is the spirit of navigation: sound, voice, speech itself, are nothing more than percussions of the air; this globe that we inhabit is completely surrounded by air; and this kind of coverture,

commonly called the *atmosphere*, has that variety of remarkable functions which perpetually stimulates and rewards the most diligent research. Experimental physics, therefore, considers the air, 1. Of itself, independently of its bulk, and the figure of its whole body; it examines its essential properties; as its gravity, density, elasticity, &c. The air-pump is here of indispensable use; and examines in what manner space, or a vacuum, is made; demonstrates the necessity of air to the preservation of animal life; the effect it has on sound, fire, and gunpowder, in vacuo; and a hundred other facts of various degrees of curiosity. 2. It considers the air of the terrestrial atmosphere, sometimes as a fluid at rest, and sometimes as in motion. And by these means it accounts for the variation of the mercury in the barometer, and why it sinks in proportion as the height of the atmosphere diminishes; as also for its figure, extent, and weight; it shows the method of determining the height of mountains, the nature of sound in general, of its propagation, and of sonorous bodies. 3. Its chemical qualities and properties, in which are to be traced some of the most splendid discoveries of modern science. See AEROLOGY, AIR, ATMOSPHERE, PNEUMATICS, &c.

But we cannot further particularise. It will suffice to remark here that the best tendency of modern philosophy is to reduce to experiment every part of natural science; to break up and away from system; and to make every part of what is taught for philosophy only a more enlarged index of nature.

PHILOSTORGIUS, an ecclesiastical historian of the fourth century, born in Cappadocia, who wrote an abridgment of ecclesiastical history, in which he treats Athanasius with severity. This work contains many curious and interesting particulars. The best edition is that of Henry de Valois in Greek and Latin. There is also attributed to him a book against Porphyry.

PHILOSTRATUS (Flavius), an ancient Greek author, who flourished between A. D. 190 and 244. He wrote The Life of Apollonius Tyanæus, and some other tracts still extant. Eusebius calls him an Athenian, because he taught at Athens; but Eunapius and Suidas always speak of him as a Lemnian: and he himself hints as much in his Life of Apollonius. He frequented the schools of the sophists, particularly Damianus of Ephesus, Proclus Naucratitas, and Hippodromus of Larissa. He was one of those learned men whom the philosophic empress Julia Augusta, wife of Severus, had continually about her. By her command he wrote the Life of Apollonius, as he himself informs us. Suidas and Hesychius say that he was a teacher of rhetoric, first at Athens, and then at Rome, from the reign of Severus to that of Philip, who obtained the empire in 244. Philostratus's Life of Apollonius has erroneously been attributed to Lucian, because it has been printed with some of that author's pieces. Philostratus endeavours, as Cyril observes, to represent Apollonius as a wonderful and extraordinary person. The sophistical and affected style of Philostratus, the sources whence his materials have been drawn, and the absurdities and contradictions with which he abounds, plainly show his history to be nothing but a collection of fables. His works, however, have engaged the attention of critics of the first class. A very exact and beautiful edition was published at Leipsic, 1709, in folio, by Olearius, professor of Greek and Latin: and a translation into English has been published by Blount. At the end of Apollonius's Life there are ninety-five letters which go under his name. They are not, however, believed to be his. Some of them, though it is not easy to determine which, were written by his nephew; as were also the last eighteen in the Book of Images. This is the reason why the title runs not Philostrati, but Philostratorum quæ supersunt omnia.

PHILOSTRATUS, nephew of the preceding, flourished in the reign of Heliogabalus, and wrote an Account of the Lives of the Sophists, which is extant, and contains many particulars which are to be met with no where else. There were other two Philostrati, both philosophers, who flourished, the one under Augustus, the other under Nero.

PHILOTAS, the name of two generals, who fought under Alexander the Great. To one of them Cilicia was allotted, on his death. A third, who also fought bravely under Alexander, was the son of Parmenio; but was put to death for conspiring against that monarch; A. A. C. 330.

PHILOTIS, a servant maid at Rome, who saved her countrymen from destruction. After the siege of Rome by the Gauls, the Fidenates assembled an army, and marched against the capital, demanding all the wives and daughters in the city as the only conditions of peace. The demand astonished the senators; and, when they refused to comply, Philotis advised them to send all their female slaves disguised in matron's clothes, and she offered to march herself at their head. Her advice was followed: and when the Fidenates had feasted late in the evening, and were quite intoxicated and fallen asleep, Philotis lighted a torch as a signal for her countrymen to attack the enemy. The whole was successful; the Fidenates were conquered; and the senate, to reward the fidelity of the female slaves, permitted them to appear in the dress of the Roman matrons.

PHILOXENUS, a dithyrambic poet of Cythera. He enjoyed the favor of Dionysius, tyrant of Sicily, for some time, till he offended him by seducing one of his female singers. During his confinement he wrote an allegorical poem, called Cyclops; in which he delineated the character of the tyrant under the name of Polyphemus, and represented his mistress under that of Galatæa, and himself under that of Ulysses. The tyrant, who was fond of poetry and applause, liberated Philoxenus; but the poet refused to purchase his liberty by saying things unworthy of himself, and applauding the wretched verses of Dionysius, who therefore sent him to

the quarries. Being set at liberty, he some time after was asked his opinion at a feast about some verses which Dionysius had repeated, and which the courtiers had received with the greatest applause. Philoxenus gave no answer, but ordered the guards that surrounded the tyrant's table to take him back to the quarries. Dionysius was pleased with his humor and firmness, and forgave him. Philoxenus died at Ephesus about A. A. C. 380.

PHILOXENUS, 1. An officer of Alexander, who received Cilicia at the general division of the provinces. He seems to be confounded with Philotas. 2. A son of Ptolemy, who was given to Pelopidas as a hostage.

PHILTER, *n. s.* & *v. a.* Fr. *philtre ;* Greek φιλτρον. Something to cause love; to charm or induce to love.

> The melting kiss that sips
> The jellied *philtre* of her lips. *Cleaveland.*

> This cup a cure for both our ills has brought,
> You need not fear a *philter* in the draught. *Dryden.*

Let not those that have repudiated the more inviting sins, shew themselves *philtred* and bewitched by this. *Government of the Tongue.*

> On high, where no hoarse winds nor clouds resort,
> The hood-winked goddess keeps her partial court;
> Upon a wheel of amethyst she sits,
> Gives, and resumes, and smiles, and frowns by fits.
> In this still labyrinth around her lie
> Spells, *philtres*, globes, and schemes of palmistry.
> *Garth's Dispensary.*

A *philter* that has neither drug nor enchantment in it, love if you would raise love. *Addison.*

PHILTER is derived from the Greek φιλεω, I love, or φιλος, a lover. Philters are distinguished into true and spurious, and were given by the Greeks and Romans to excite love. The spurious are spells or charms, supposed to have an effect beyond the ordinary laws of nature by some magic virtue. Many grave authors have believed the reality of these philters, and alleged facts in confirmation of their sentiments; among the rest, VAN HELMONT.

PHILTER, or PHILTRE. Lat. philtrum. In pharmacy, &c., a strainer.

PHILYRA, in fabulous history, one of the Oceanides, whom Saturn met in Thrace. The god, to escape from the vigilance of Rhea, changed himself into a horse, to enjoy the company of Philyra, by whom he had a son, half a man and half a horse, called Chiron. Philyra was so ashamed of giving birth to such a monster, that she entreated the gods to change her nature. She was accordingly metamorphosed into a tree, called by her name among the Greeks.

PHIMOSIS, or rather PHYMOSIS, in medicine, Gr. φίμωσις, a disorder in the glans penis, when it is bound too tight by the præputium and cannot be uncovered: also a firm carnosity of the anus.

PHINEAS, or PHINEHAS, or, as the Jews pronounce it, Pinchas, the son of Eleazar, and grandson of Aaron. He was the third high priest of the Jews, and discharged this office from A. M. 2571 till 2590. He was particularly commended in Scripture for the zeal he showed for the preservation of his countrymen from idolatry, on two different occasions; Num. xxv. 7—15, and Josh. xxii. 13—34. The dignity of the high priesthood continued in the race of Phineas, from Aaron down to the high priest Eli, for about 335 years; when it was forfeited by the wickedness of Eli's sons. It returned, however, again into the family of Eleazar in the reign of Saul, who, having killed Abimelech, and the other priests and people of Nob, gave the high-priesthood to Zadok, of the race of Phinehas. At the same time David had Abiathar with him, of the race of Eli, who performed the functions of high priest. So that, after the death of Saul, David continued the priesthood to Zadok and Abiathar conjointly. But, towards the end of David's reign, Abiathar having joined in the conspiracy of Adonijah, to the prejudice of Solomon, he was disgraced, and Zadok only was acknowledged. The priesthood continued in his family till after the captivity of Babylon, and even to the destruction of the temple. From the beginning of Zadok's priesthood alone, and the exclusion of Abiathar, to the ruin of the temple, is 1084 years. As Phineas lived after the death of Joshua, and before the first servitude under Cushan-rishathaim, during the republic (Judges xvii. 6, xviii. 1, xxi. 24), his death is supposed to have happened A. M. 2590. The rabbies allow a very long life to Phineas. Some say he lived to the time of the high priest Eli, or even to that of Samson.

PHINEUS, in fabulous history, was son of Agenor, king of Phœnicia, or, according to some, of Neptune. He became king of Thrace or Bithynia. He married Cleopatra or Cleobula, the daughter of Boreas, by whom he had Plexippus and Pandion. After her death, he married Idæa or Idothæa, the daughter of Dardanus. Idæa, jealous of his former wife's children, accused them of attempts upon their father's life and crown, or, as others assert, of attempts upon her virtue; on which they were condemned by Phineus to be deprived of their eyes. This cruelty was soon after punished by the gods; for Phineus suddenly became blind, and the harpies were sent by Jupiter to keep him in continual alarm, and to spoil the meats on his table. He was afterwards delivered from these monsters by his brothers-in-law Zetes and Calais, who pursued them as far as the Strophades. He likewise recovered his sight by means of the Argonauts, whom he had received with great hospitality, and whom he instructed in the easiest and speediest way of arriving at Colchis. He was killed by Hercules.

PHINTIA, an ancient town of Sicily, at the mouth of the Chimera.—Cicero, in Verr.

PHIPPS (Constantine John), lord Mulgrave, F. R. S., a late celebrated British navigator, born in 1746. He was great grandson of Constantine Phipps, lord chancellor of Ireland in 1714, and son of Constantine, the first lord Mulgrave, by Catharine, daughter of the earl of Anglesea. He succeeded his father in 1775. He entered young into the naval service, under his uncle, the earl of Bristol. He was elected M. P. for Lincoln, and became an able speaker. He was also eminent as a naval commander, and made a voyage to the North Pole, from June 4th, to September 24th, 1773, to determine how far navigation was practicable to the north pole; an account of

which he published in 1774. He is also said to have written the masterly Introduction to Captain Cook's last Voyage. He married Anne Elizabeth, daughter of Nathaniel Cholmondeley, esq. of Honsham, in Yorkshire, a rich heiress, who died in 1780, leaving a daughter. He was created a British peer June 17th, 1790; and died at Liege, October 10th, 1792; leaving a large fortune, and one of the completest libraries in England, for works on naval science.

PHIZ, *n. s.* A ridiculous contraction of physiognomy; the face, in a sense of contempt.

His air was too proud, and his features amiss,
As if being a traitor had altered his *phiz*. *Stepney.*

The emphatic speaker dearly loves to oppose,
In contact inconvenient, nose to nose;
As if the gnomon on his neighbour's *phiz*
Touched with the magnet had attracted his. *Cowper.*

PHLEBOT'OMIZE, *n. s.* & *v. a.* } Fr. *phle-*
PHLEBOT'OMY, *n. s.* } *botomie*; Gr. φλεβοτομία, φλεψ, φλεβος, vena, and τεμνω, to cut. Bloodletting; the act or practice of opening a vein for medical intentions; to let blood.

Pains for the spending of the spirits, come nearest to the copious and swift loss of spirits by *phlebotomy*. *Harvey.*

Phlebotomy is not cure, but mischief; the blood so flowing as if the body were all vein. *Holyday.*

The frail bodies of men must have an evacuation for their humours, and be *phlebotomized*. *Howel's England's Tears.*

Although, in indispositions of the liver or spleen, considerations are made in *phlebotomy* to their situation, yet, when the heart is affected, it is thought as effectual to bleed on the right as the left. *Browne.*

PHLEGETHON, Gr. φλεγεθω, i. e. burning, in mythology, a river of Hell, whose waters flamed.—Virg. Æn. vi. 550.

PHLEGM, *n. s.* } Fr. *phlegme*; Greek
PHLEG'MAGOGUES, } φλεγμα. A watery ani-
PHLEGMAT'IC, *adj.* } mal humor, formerly supposed to produce sluggishness; phlemagogues are purges to evacuate phlegm: phlegmatic is, abounding in phlegm; dull.

A neat's foot, I fear, is too *phlegmatick* a meat. *Shakspeare.*

The putrid vapours, though exciting a fever, do colliquate the *phlegmatick* humours of the body. *Harvey.*

Negroes, transplanted into cold and *phlegmatick* habitations, continue their hue in themselves and generations. *Browne.*

Make the proper use of each extreme,
And write with fury, but correct with *phlegm*. *Roscommon.*

A linen cloth, dipped in common spirit of wine, is not burnt by the flame, because the *phlegm* of the liquor defends the cloth. *Boyle.*

The pituitous temper of the stomachick ferment must be corrected, and the *phlegmagogues* must evacuate it. *Floyer.*

As the inhabitants are of a heavy *phlegmatick* temper, if any leading member has more fire than comes to his share, it is quickly tempered by the coldness of the rest. *Addison.*

Spirit of wine is inflammable by means of its oily parts, and, being distilled often from salt of tartar, grows by every distillation more and more aqueous and *phlegmatick*. *Newton.*

Chewing and smoking of tobacco is only proper for *phlegmatick* people. *Arbuthnot on Aliments.*

He who supreme in judgment, as in wit,
Might boldly censure, as he boldly writ,
Yet judged with coolness, though he sung with fire;
His precepts teach but what his works inspire.
Our critics take a contrary extreme,
They judge with fury, but they write with *phlegm*. *Pope.*

Let melancholy rule supreme,
Choler preside, or blood or *phlegm*,
It makes no difference in the case,
Nor is complexion honour's place. *Swift.*

Who but a husband ever could persuade
His heart to leave the bosom of thy love,
For any *phlegmatick* design of state! *Southern.*

PHLEGM, in the animal economy, was one of the four humors whereof the ancients supposed the blood to be composed. The chemists make phlegm or water an elementary body; the characters of which are fluidity, insipidity, and volatility.

PHLEGMASIA, an order of diseases, in Dr. Cullen's system of physic. See MEDICINE, Index.

PHLEG'MON, *n. s.* } Gr. φλεγμονη. An
PHLEG'MONOUS, *adj.* } inflammation; burning tumor; inflammatory.

Phlegmon, or inflammation, is the first degeneration from good blood, and nearest of kin to it. *Wiseman.*

It is generated secondarily out of the dregs and remainder of a *phlegmonous* or œdematic tumour. *Harvey.*

PHLEGON, surnamed Trallianus, was born in Trallis, a city of Lydia. He was the emperor Hadrian's freed man, and lived to the eighteenth year of Antoninus Pius. He wrote several works of great erudition, of which we have nothing left but fragments. Among these was a History of the Olympiads, A Treatise of Long-lived Persons, and another of Wonderful Things. The titles of part of the rest of Phlegon's writings are preserved by Suidas. It has been supposed that the History of Hadrian, published under Phlegon's name, was written by Hadrian himself. A passage quoted by Eusebius from one of his works, respecting an extraordinary eclipse of the sun attended by an earthquake, has been supposed to allude to the darkness and earthquake that happened at our Saviour's passion. But this has been disputed among the learned; Whiston and others taking the affirmative, and Sykes the negative.

PHLEGYÆ, an ancient people of Thessaly, who, under their leader Phlegyas, plundered and burnt the temple of Apollo at Delphi. A few of them afterwards settled at Phocis.—Paus. ix. 36, Hom. Il. 13.

PHLEGYAS, in fabulous history, a son of Mars, king of the Lapithæ in Thessaly, and father of Ixion, and of Coronis, the mother of Æsculapius by Apollo. Phlegyas, in revenge for his daughter's disgrace, collected an army of the Phlegyæ, and plundered and burnt Apollo's temple; for which Apollo killed him and placed him in hell, with a large stone ready to fall on his head.—*Paus.* ix. 36, *Ovid. Met.* v. 87.

PHLEME, *n. s.* Lat. *phlæbotomus*. Commonly written fleam. An instrument placed on

the vein, and driven into it with a blow; particularly in bleeding of horses.

PHLEUM, in botany, cat's-tail grass, a genus of the digynia order, and triandria class of plants; natural order fourth, gramina.

PHLIAS, the son of Bacchus and Ariadne, one of the Argonauts.—Paus. ii. 12.

PHLOGISTIC, from phlogiston. Inflammatory; of or belonging to phlogiston, or inflammability. In this sense it is used by Dr. Cullen of inflammatory diseases. Dr. Brown, also, in his first edition of his Elementa Medicinæ, used this word in a sense somewhat similar, and the opposite term antiphlogistic for diseases of debility; but he afterwards changed these terms to sthenic and asthenic as more proper to express diseases of strength and weakness.

PHLOGISTICATED, in chemistry, impregnated with the imaginary principle of phlogiston; a term and doctrine now nearly obsolete.

PHLOGISTON was formerly used by chemists to express a principle which was supposed to enter the composition of various bodies, but which is now exploded. The bodies which were thought to contain it in the largest quantity are the inflammable substances; and the property which these substances possess of being susceptible of inflammation was thought to depend on this principle; and hence it was sometimes called the principle of inflammability. Inflammation, according to this doctrine, was the separation of this principle, or phlogiston, from the other matter which composed the combustible body. As the emission of light and heat always attended its separation, the chemists concluded that it was light and heat combined with other matter in a peculiar manner, or that it was some highly elastic and very subtile matter, on certain modifications of which heat and light depended. But its existence, as a chemical principle in the composition of bodies, is now fully proved to be false. Sir Isaac Newton was the first who established chemistry on scientific ground. From his time till the middle of the eighteenth century no real improvement was made. The progress this science has made since that period is owing to the important discovery of the existence of heat in a state of composition with other matter. Heat, thus combined, loses its activity, or becomes insensible, just as acids, or any other active substance, lose their apparent qualities in composition. Heat, in this combined state, was called by its ingenious discoverer, Dr. Black, latent heat, and it was found to be very abundant in the atmosphere, which owes its existence as an elastic fluid to the quantity of latent heat that it contains. After this discovery, Crawford, considering that air was absorbed by a burning body, concluded that the heat which appears in the combustion of a combustible body is the heat that had before existed in the air which was consumed by the burning body. Lavoisier and others, prosecuting this enquiry, found that the combustible body, while it is burning, unites with the basis of the air, and that the heat which the air contained, and which was the cause of the air existing in the state of air, is expelled. See, however, this theory more fully elucidated under CHEMISTRY, HEAT, OXYGEN &c.

PHLOGOTICA. Phlogoticus; from φλεγω, to burn. The name of the second order of the class hæmatica, in Good's Nosology. Inflammations. Its genera are apostema, phlegmone, phyma, ionthus, phlysis, erythema, empresma, ophthalmia, catarrhus, dysenteria, bucnemia, arthrosia.

PHLOMIS, the sage-tree, or Jerusalem sage; a genus of the gymnospermia order, and didynamia class of plants: natural order forty-second, verticillatæ. There are fourteen species, all of which have perennial roots, and of many the stalks also are perennial. The latter rise from two to five or six feet high; and are adorned with yellow, blue, or purple flowers in whorls. They are all ornamental plants; and deserve a place in gardens, as they are sufficiently hardy to endure the ordinary winters in this climate: they require, however, a pretty warm situation. There are two species peculiarly adapted to the shrubbery, viz.

1. P. fructicosa, a native of Spain and Sicily. Of this there are three varieties, 1. The broad-leaved Jerusalem sage-tree is now very common in our gardens. Its beauty is great, and its culture very easy. It grows to about five feet high, and spreads its branches without order all around. The old branches are covered with a dirty, greenish, dead, falling, ill-looking bark; and this is the worst property of this shrub; but the younger shoots are white and beautiful; they are four-cornered, woolly, and soft to the touch. The leaves are roundish, oblong, and moderately large; these grow opposite at the joints of the shrub on long foot-stalks. They are hoary to a degree of whiteness, and their foot-stalks are woolly, white, tough, and strong. The flowers are produced in June, July, and August, at the top joints of the young shoots, in large whorled bunches. They are labiated, each consisting of two lips, the upper end forked, and bending over the other. The color is a most beautiful yellow, and, being large, they exhibit their golden flowers at a great distance. 2. The narrow leaved Jerusalem sage-tree is of lower growth than the other, seldom rising higher than a yard or four feet. This shrub is in every respect like the other; only the shoots have a more upright tendency. The leaves also are narrower, and more inclined to a lanceolate form: they are numerous in both sorts, and hide the deformity of the bark on the older stems. In short, these sorts are qualified for shrubberies of all kinds, or to be set in borders of flower-gardens, where they will flower, and be exceeded by very few shrubs. 3. The Cretan sage-tree is still of lower growth than either of the former, seldom arising to a yard in height. The leaves are of the same white hoary nature; they are very broad, and stand on long foot-stalks. The flowers are of a delightful yellow color, very large, and grow in large whorls, which give the plant great beauty.

2. P. purpurea, purple phlomis, or Portugal sage, four feet high; the stalks woody, and sending forth several angular branches, which are covered with a white bark. The leaves are spear-shaped, oblong, woolly underneath, crenated, and grow on short foot-stalks. The flowers

are produced in whorls from the joints of the branches. They are of a deep purple color, and have narrow involucra. They appear in June and July, but are not succeeded by ripe seeds in England. There is a variety of this species with iron-colored flowers, and another with flowers of a bright purple. There are some other shrubby sorts of phlomis, of great beauty; but these not only often lose their leaves, and even branches, from the first frost, but are frequently wholly destroyed, if it happen to be severe. They are low shrubs, very beautiful, and look well among perennial flowers, where they will not only class as to size with many of that sort, but, being rather tender, may with them have such extraordinary care as the owner may think proper to allow them. The propagation of the above sorts is very easy, and is accomplished either by layers or cuttings. 1. If a little earth be thrown upon the branches any time in the winter, they will strike root and be good plants by the autumn following, fit for any place. Thus easy is the culture by that method. 2. The cuttings will also grow, if planted any time of the year. Those planted in winter should be the woody shoots of the former summer: these may be set close in a shady border; and, being watered in dry weather, will often grow. This shrub may be propagated by young slips also, in any of the summer months. These should be planted in a shady border, like sage, and well watered. If the border is not naturally shady, the beds must be hooped, and covered with matting in hot weather. Watering must be constantly afforded them; and with this care and management many of them will grow.

PHLOX, the lychnidea, or bastard lychnis; a genus of the monogynia order, and pentandria class of plants. natural order twentieth, rotaceæ. There are seven species, all natives of North America. They have perennial roots, from which rise herbaceous stalks, from nine inches to two feet in height, adorned with tubulated flowers of a purple color. They are propagated by offsets, and will bear the winters in this country. They require a moist, rich soil, in which they thrive better, and grow faster than in any other.

PHLYCTENÆ, in medicine, small eruptions on the skin.

PHOBETOR, from φοβεω, to terrify, in mythology, one of the sons of Somnus, and his prime minister. His office was to terrify men during sleep, by appearing to them in the form of a wild beast or serpent.—Ovid. Met. xi. 640.

PHOCA, in zoology, a genus of quadrupeds of the order feræ. There are six sharp-pointed fore-teeth in the upper jaw, the two outermost being larger; and four blunt, parallel, distinct, equal fore teeth in the under jaw. There is but one dog-tooth, and five or six three-pointed grinders; and the hind legs are united so as to resemble a sheep's tail; are stretched much backwards, and bound together. Mr. Kerr enumerates nineteen species, and five varieties.

1. P. Australis, the Falkland seal, has short pointed external ears, and inhabits the Falkland Isles. The color is cinereous; the hairs tipt with a dirty white; the nose is short, and beset with strong black bristles; the fore feet have no claws; the hind paws have four long claws. The animal measures four feet.

2. P. barbata, the great seal, has long white whiskers with curled points. The back is arched, black, very deciduous, and very thinly dispersed over a thick skin, which is almost naked in summer. The teeth of this species are like those of the common seal (No. 18); the fore feet are like the human hand, the middle toe being the longest, and the thumb short. They are upwards of twelve feet long. The Greenlanders cut out of the skin of this species thongs and lines, a finger thick, for the seal fishery. Its flesh is as white as veal, and is esteemed the most delicate of any. They produce plenty of lard, but very little oil. The skins of the young are sometimes used to lie on. They inhabit the high sea about Greenland, are very timid, and commonly rest on the floating ice. The females breed about March, and bring forth each a single young one on the ice, generally among the islands. The old ones swim very slowly. On the north coast of Scotland is found a species twelve feet long. A young one, seven feet and a half long, was shown in London some years ago, which was so far from maturity as to have scarcely any teeth: yet the common seals have them complete before they attain the size of six feet, their utmost growth. One of this species, larger than an ox, was found in the Kamtschatkan seas, from 56° to 64° lat. N., called by the natives lach-tak. They weighed 800lbs. and were eaten by Behring's crew; but their flesh was loathsome. The cubs are entirely black.

3. P. Chilensis, the Chilese seal, has a longish snout, external ears, and five toes to each foot. It inhabits the coasts of Chili and Juan Fernandez.

4. P. cristata, the klapmus, or hooded seal of Pennant, has a crest on the fore part of the head; the body is of a gray color, having a thick coat of black wool, interspersed with white hairs. It is a large animal, and has a strong folded skin on its forehead, falling over its eyes and nose. This species inhabits the south coast of Greenland, west of Iceland and Newfoundland.

5. P. fasciata, the harnessed seal, or rubbon seal of Pennant, is of a blackish color, and marked with yellow stripes resembling harness across the neck, along the sides, and haunches. They inhabit the Kurile Isles.

6. i. P. grœnlandica, the swartside, of Erxleben, the attarsoak of Crautz, or harp seal of Pennant, has a smooth head, no external ears, the body gray, with a black semilunar mark on the side. Both fore and hind paws have distinct nails; the head is black and pointed; the tail short and horizontal. The animal is nine feet long. They inhabit Greenland, Newfoundland, Iceland, the Whale Sea, the Frozen Ocean and Kamtschatka. The skin is good and the oil much valued.

ii. P. groenlandica nigra, the bedlemer, is a blackish variety of the above.

7. i. P. hespida, or P. fœtida, the neitsek, or rough seal, is distinguished by a short nose and short round head; a body almost elliptical, covered with lard almost to the hind feet. This

species seldom exceeds four feet in length. Their hairs are closely set together, soft, long, and somewhat erect, intermixed with curls. They are of a dusky color; mixed with white, which sometimes varies to white, with a dusky dorsal line. They never frequent the high seas, but keep on the fixed ice in the remote bays near the frozen land; and, when old, never forsake their haunts. They couple in June, and bring forth in January on the ice. In that cold situation they have a hole for fishing; near which they generally remain solitary, being rarely found in pairs. They often sleep on the surface of the water, and thus become an easy prey to the eagle. They feed on small fish, shrimps, &c. The skin, tendons, and lard, are used in the same way with those of other seals. The flesh is red and fœtid, especially in males, which is nauseated even by the Greenlanders.

ii. P. hispida quadrata, or Newfoundland seal, is a larger variety of the above, called by the seal-hunters in Newfoundland, the square phipper. It weighs 500 lbs. Its coat is like that of a water-dog; so that it appears by the length of its hair to be allied to this species; but the vast difference in size admits not of that decision.

8. P. jubata, the maned seal of Schreber, or leonine seal of Pennant, inhabits the coast of the North Pacific Ocean, west coast of America, Falkland Islands, Patagonia, Kamtschatka, and the Kurile Isles. The color is reddish; the males are sometimes twenty-five feet long, weigh 15 or 1600 lbs., and have a long flowing mane on their necks. Their voice is like that of a bull; the head is large; nose short and turned up; with large strong whiskers; the eyes are large; the fore feet black, resembling fins, without toes; the hind feet very broad, with small nails, and very short tails. They live in families, each male having many females, about which they often quarrel and fight.

9. P. laniger, or phoca leporina, the leporine seal of Pennant, has hair of a dirty white color, tinged with yellow, but never spotted. The hairs are erect, interwoven, and soft like those of a hare, especially in those of the young. The head is long, the upper lip swelling and thick; the whiskers very strong and very thick, ranged in fifteen rows, covering the whole front of the lip, so that it appears bearded; the eyes are blue, and the pupil black; the teeth are strong; the fore-feet short; the membranes of the hind feet even and not waved; the tail is short and thick, it being four inches two lines in length; the cubs are of a milk-white color. The length of this species is about six feet six inches, and the circumference where greatest five feet two. This species inhabit the White Sea in the summer time, and ascend and descend the rivers with the tide in quest of prey. They are likewise found on the coast of Iceland, and within the polar circle from Spitzbergen to Tchutki Noss, and thence south about Kamtschatka.

10. P. leonina, the sea-lion of Anson, the sea-wolf of Pernetty, or the bottle-nose of Pennant, is found near the south pole. One variety of this species is described at some length by the publisher of Anson's voyage. Of these we have the following account in Pernetty's Historical Journal:—'The hair that covers the back part of the head, neck, and shoulders, is at least as long as the hair of a goat. It gives this amphibious animal an air of resemblance to the common lion of the forest, excepting the difference of size. These sea-lions are twenty-five feet in length, and from nineteen to twenty in circumference. Those of the small kind have a head resembling a mastiff's with close cropt ears. The teeth of those which have manes are much larger and more solid than those of the rest. In these all the teeth in the jaw-bone are hollow. They have only four large ones, two in the lower and two in the upper jaw. The rest are not even so large as those of a horse. They inhabit the coasts of Chili, New Zealand, Juan Fernandez, Falkland Isles, and New Georgia. These sea-lions that have manes are not more mischievous or formidable than the others. They are equally unwieldy and heavy in their motions; and are rather disposed to avoid than to fall upon those who attack them. Both kinds live upon fish and water fowls, which they catch by surprise. They bring forth and suckle their young ones among the corn flags, where they retire at night, and continue to give them suck till they are large enough to go to sea. In the evening they assemble in herds upon the shore, and call their dams in cries so much like lambs, calves, and goats, that, unless apprised of it, one would easily be deceived. The tongues of these animals are very good eating. The oil which is extracted from their grease is of great use. It is preferred to that of the whale; it is always clear, and leaves no sediment. The skins of the sea-lions are chiefly used in making portmanteaus, and in covering trunks. When they are tanned they have a grain almost like Morocco. They are not so fine, but are less liable to tear, and keep fresh a longer time. They make good shoes and boots, which, when well seasoned, are water-proof.

11. P. maculata, the spotted seal of Pennant, inhabits the Kurile Isles, and the seas of Kamtschatka. The body is spotted with brown.

12. P. monachus, the hooded seal, or Mediterranean seal of Pennant, inhabits chiefly the coast of Dalmatia. It has no external ears; only four cutting teeth in each jaw; the fore paws are not divided; the hinder paws have no nails. The skin of it folds like a monk's hood, whence the names. The body is eight feet seven inches long, and five feet round.

13. P. mutica, the long-necked seal of Pennant, has a slender body, and no claws on the fore feet, which resemble fins.

14. P. nigra, the black seal of Pennant, has a peculiar, but undescribed, conformation of the hind legs. They inhabit the coast of the Kurile Isles.

15. P. punctata, the speckled seal of Pennant, is elegantly speckled all over the body, head, and limbs. They inhabit the seas of Kamtschatka and the Kurile Isles.

16. P. pusilla, the little seal of Schreber, Pennant, and Buffon; the φοκη of Aristotle; the vitulus marinus of Pliny, and the sea-calf of Dampier; has a smooth head, and the rudiments of external ears; the body is brown, and measures two feet two inches.

17. P. testudo, the tortoise-headed seal of Pennant, has a head like that of a tortoise, a slender neck, and feet like those of the common seal. It is found on the coasts of many places of Europe.

18. i. P. vitulina, the sea-calf, or common seal, inhabits the European ocean. It has a smooth head, without external ears; and the common length is from five to six feet. The fore legs are deeply immersed in the skin of the body. The hind legs are placed in such a manner as to point directly backwards; every foot has five toes, connected by a strong and broad web, covered on both sides with short hair. The toes are furnished with strong claws, well adapted for climbing the rocks; the claws on the hind feet are slender and straight; but at the ends a little incurvated. The head and nose are broad and flat, like those of the otter; the neck short and thick; the eyes large and black; in lieu of external ears, it has two small orifices; the nostrils are oblong; on each side the nose are several long stiff hairs; and above each eye are a few of the same kind. The form of the tongue is very singular, being forked or slit at the end. The cutting teeth are six in the upper jaw, and only four in the lower. It has two canine teeth above and below, and on each side of the jaw are five grinders; in all thirty-four. The whole body is covered with short hair, very closely set together: the color of that on the body is generally dusky, spotted irregularly with white; on the belly white; but seals vary greatly in their colors: some have been found entirely white. The seal is common on most of the rocky shores of Great Britain and Ireland, especially on the north coasts. In Wales it frequents the coasts of Caernarvonshire and Anglesey. They inhabit all the European seas, even to the extreme north; are found far within the arctic circle, in the seas both of Europe and Asia, and even those of Kamtschatka. They prey entirely on fish, and never molest the sea-fowls; for numbers of each are often seen floating on the waves, as if in company. Seals eat their prey beneath the water; and, when devouring any very oily fish, the place is known by the smoothness of the waves immediately above. They are excellent swimmers, ready divers, and very bold when in the sea, swimming carelessly about boats. Their dens are in caverns near the sea, but out of the reach of the tide; in summer they will come out of the water, to bask in the sun on large rocks; and that is the opportunity our countrymen take of shooting them: if they chance to escape, they hasten towards their proper element, flinging stones and dirt behind them as they scramble along: and expressing their fears by piteous moans; but, if they be overtaken, they will make a vigorous defence with their feet and teeth till they are killed. They are taken for the sake of their skins, and for the oil their fat yields.

The flesh of these animals, and even of porpoises, formerly found a place at the tables of the great, as appears from the bill of fare of the vast feast that archbishop Nevill gave in the reign of Edward IV. They couple about April, on small islands near the shore; and bring forth in those vast caverns that are numerous on our coasts: they commonly bring two at a time, which in their infant state are covered with a whitish down or woolly substance. In October and November the seal-hunters of Caithness enter the mouth of the caverns about midnight, and, rowing up as far as they can, land; each of them being provided with a bludgeon, and properly stationed, they now light their torches, and make a great noise, which brings down the seals from the further end, in a confused body, with fearful shrieks and cries: at first the men are obliged to give way for fear of being overborne; but when the first crowd is past, they kill as many as straggle behind, chiefly the young, by striking them on the nose, where a very slight blow despatches them. Seals are seen in the greatest plenty on the shores of Cornwall, in May, June, and July. Their heads in swimming are always above water. They sleep on rocks surrounded by the sea, or on the less accessible parts of our cliffs left dry by the ebb of the tide; and, if disturbed by any thing, take care to tumble over the rocks into the sea. They are extremely watchful, and never sleep long without moving; then raise their heads, and lie down again, and so on, raising their heads and reclining them alternately in about a minute. They use this precaution, as being unprovided with external ears; and consequently not hearing very quick, nor from any great distance. These animals are so very useful to the inhabitants of Greenland, and other arctic people, that they may be called their flocks. 'Seals,' says Crantz, 'are more needful to them than sheep are to us, though they furnish us with food and raiment; or than the cocoa-tree is to the Indians. The seal's flesh, with that of the reindeer, supplies the natives with their most substantial food. Their fat furnishes them with oil for lamp-light, chamber, and kitchen fire. They also mollify their dry food, mostly fish, in the train; and they barter it for all kinds of necessaries with the factor. They can sew better with the fibres of the seal's sinews than with thread or silk. Of the skins of the entrails they make their windows, curtains for their tents, shirts, and part of the bladders they use at their harpoons; and they make train bottles of the maw. Formerly, for want of iron, they made all manner of instruments and working tools of their bones. Neither is the blood wasted, but boiled with other ingredients, and eaten as soup. Of the skin of the seal they stand in the greatest need; as they cover over with it their boats in which they seek their provisions. They also cut their straps out of them, and cover their tents with them; without which they could not subsist in summer. This is their chief business and labor from their childhood. The Greenlanders have four ways of catching seals: either singly, with the bladder; or in company, by the clapper-hunt; or in winter on the ice; or by shooting them with a gun. The principal and most common way is the taking them with a bladder. When the Greenlander sets out equipped, and spies a seal, he tries to surprise and strike it with his harpoon. The moment the seal is pierced, the Greenlander must throw the bladder, tied to the end of the string, into the water, on the same side as the seal runs and dives; for that he does

instantly like a dart. The seal often drags the bladder under water, but so wearies itself with it, that it must come up again in fifteen minutes to breathe. The Greenlander hastens to the spot, smites the seal with a long lance, and kills it, but stops the wound directly to preserve the blood; and, lastly, he blows it up like a bladder, to make it swim after him, fastened to the left side of his boat. In this exercise the Greenlander is exposed to the most imminent danger of his life, which is probably the reason that they call this hunt or fishery kamavock, i. e. the extinction, viz. of life. For if the line should entangle itself, or catch hold of the kajak or boat, or twine round the oar, hand, or neck, or if the seal should turn suddenly to the other side of the boat, the kajak must be overturned by the string, and drawn down under water. Nay, sometimes the seal will bite him in the face or hand, or bite a hole in his kajak, so that he must sink. Several in company must pursue the cautious kassigiak by the clapper-hunt. In the same manner they also surround and kill the attersoak in great numbers at certain seasons of the year, for in autumn they retire into the creeks or inlets in stormy weather, as in the Nepiset Sound in Ball's River, between the main land and the island Kangek, which is full two leagues long, but very narrow. There the Greenlanders cut off their retreat, and frighten them under water by shouting, clapping, and throwing stones; but, as they must come up again to draw breath, they kill them with darts. This is a very profitable diversion for the Greenlanders, for often one man will have eight or ten seals for his share. The third method of killing seals upon the ice is mostly practised in Disko, where the bays are frozen over in the winter. The seals make sometimes holes in the ice, where they breathe; near such a hole a Greenlander places himself, and, when the seal puts his nose to the hole, he pierces it instantly with his harpoon; then breaks the hole larger, draws it out, and kills it.'

ii. P. vitulina Bothnica is a variety differing in having a broader nose, longer nails, and a darker color. They inhabit the Gulf of Bothnia.

iii. P. vitulina Caspica, the Caspian seal, is of a mixed color, and inhabits the Caspian Sea.

iv. P. vitulina Siberica, the Siberian seal, is of a silver white color, and inhabits the lakes Baikal and Orom, in Siberia.

19. P. ursina, the sea bear, or ursine seal, has external ears. The male is greatly superior in size to the female. The bodies of each are of a conic form, very thick before, and taper to the tail. The length of a large one is eight feet; the greatest circumference five feet; near the tail twenty inches; and the weight is about 800 lbs. The nose projects like that of a pug-dog, but the head rises suddenly; the teeth lock into one another when the mouth is shut; the tongue is large; the eyes are large and prominent, and may be covered at pleasure by a fleshy membrane. The length of the fore legs is twenty-four inches; they are like those of other quadrupeds, not immersed in the body like those of seals; the feet are formed with toes like those of other animals, but are covered with a naked skin, so that externally they seem to be a shapeless mass; the hind legs are fixed to the body quite behind, like those of common seals; but are capable of being brought forward, so that the animal makes use of them to scratch its head. These animals are found in the northern seas, and in amazing quantities between Kamtschatka and America; but are scarcely known to land on the Asiatic shore: nor are they ever taken, except in the three Kurilian Islands; and thence in the Bobrowoie More, or Beaver Sea, as far as the Kronski headland, off the river Kamtschatka, which comprehends only from 50° to 56° lat. N. It is observable that they never double the southern cape of the peninsula, or are found on the western side in the Penschinska Sea; but their great resort has been observed to be to Bhering's Islands. They are regularly migratory. They first appear off the three Kurile Islands and Kamtschatka in the earliest spring. There is not one female which does not come pregnant. Such as are then taken are opened, the young taken out and skinned. They are found in Bhering's Island only on the western shore, being the part opposite to Asia, where they first appear on their migration from the south. Ursine seals are also found in the southern hemisphere, from under the line in the isle of Gallipagos, to New Georgia, in lat. 54° 15′ S., and long. 37° 15′ W. In the intermediate parts they are met with in New Zealand, in the isle of Juan Fernandez, and Massa Fuera, and along the coasts of Chili to Terra del Fuego and Staten Land. In Juan Fernandez, Staten Land, and New Georgia, they swarm; as they do at the northern extremity of this vast ocean. Those of the southern hemisphere also migrate. Alexander Selkirk, who passed four lonely years on the isle of Juan Fernandez, remarked that they come ashore in June, and stay till September. Captain Cook found them again in their place of emigration in equal abundance, on Staten Land and New Georgia, in December and January; and Don Pernetty found them on the Falkland Islands in February. According to the Greenlanders, this species inhabit the southern parts of their country. They call it auvekejak, and say it is very fierce, and tears to pieces whatsoever it meets; that it lives on land as well as in water, and is greatly dreaded by the hunters. During the three months of summer they lead a most indolent life; they arrive at the islands vastly fat; but during that time they are scarcely ever in motion, confine themselves for whole weeks to one spot, sleep a great part of the time, eat nothing, and, except the employment the females have in suckling their young, are totally inactive. They live in families: each male has from eight to fifty females, whom he guards with the jealousy of an eastern monarch; and, though they lie by thousands on the shores, each family keeps itself separate from the rest, and sometimes, with the young and unmarried ones, amount to 120. The males are very irascible, and often fight about the females. They swim very swiftly, at the rate of seven miles an hour. If wounded, they will seize on the boat, and carry it along with vast impetuosity, and oftentimes sink it. They can continue a long time under water. When they want to climb

the rocks, they fasten with their fore paws, and draw themselves up. They are very tenacious of life, and will live for a fortnight after receiving such wounds as would immediately destroy any other animal. The Kamtschatkans take them by harpooning, for they never land on their shore. To the harpoon is fastened a long line, by which they draw the animal to the boat after it is spent with fatigue; but, in the chace, the hunters are afraid of too near an approach, lest the animal should fasten on and sink their vessel. Their emigration is in September, when they depart excessively lean, and take their young with them. On their return they generally frequent the same places which they did in the spring. Their winter retreats are unknown; but are supposed to be the islands between Kurili and Japan, called Campagna Land, Staten Land, Jeso Gasima, and which were discovered by Martin Uriel in 1642. They arrive along the shores of the Kurile Islands, and part of those of Kamtschatka, from the south. They inhabit only the west side of Bhering's Isle which faces Kamtschatka; and, when they return in September, their route is due south, pointing towards the discoveries of Uriel.

PHOCÆA, the last town of Ionia, and of Æolis, because situated on the right or north side of the Hermus, which he makes the boundary of Æolis to the south (Mela, Plin. Ptol.). It stood far in the land, on a bay or arm of the sea; had two very safe harbours, the one called Lampter, the other Naustathmos (Livy). It was a colony of Ionians, situated in the territory of Æolis (Herod). Massilia in Gaul was a colony from it. It was one of the twelve cities which assembled in the Panionium, or general council of Ionia. Some writers tell us that, while the foundations of this city were laying, there appeared near the shore a great shoal of sea-calves; whence it was called Phocæa, from φωκη, a sea-calf. Ptolemy, who makes the Hermus the boundary between Æolia and Ionia, places Phocæa in Æolis; but all other geopraphers reckon it among the cities of Ionia. It stood on the sea-coast, between Cuma on the north, and Smyrna on the south, near Hermus; and was anciently one of the most wealthy and powerful cities of all Asia; but is now a poor village, though the see of a bishop.

The Phocæans were expert mariners, and the first among the Greeks that undertook long voyages; which they performed in galleys of fifty oars. As they applied themselves to trade and navigation, they became acquainted pretty early with the coasts and islands of Europe, where they are said to have founded several cities, viz. Velia, in Italy; Alalia, or Aleria, in Corsica; and Massilia (now Marseilles), in Gaul. Neither were they unacquainted with Spain; for Herodotus tells us that, in the time of Cyrus the Great, the Phocæans arriving at Sartessus, a city in the Bay of Cadiz, were treated with extraordinary kindness by Argathonius king of that country, who, hearing that they were under apprehension of the growing power of Cyrus, invited them to settle in his kingdom. The Phocæans could not be prevailed upon to forsake their country; but accepted a large sum of money, which that prince generously gave them, to defray the expense of building a strong wall round their city. This wall they built on their return; but it was unable to resist the power of Cyrus, whose general, Harpagus, investing the city with a numerous army, soon reduced it to the utmost extremities. The Phocæans offered to capitulate, but, the conditions offered by Harpagus seeming severe, they begged he would allow them three days to deliberate, and, in the mean time, withdraw his forces. Harpagus complied with their request, and the Phocæans put their wives, children, and most valuable effects on board several vessels, and conveyed them to the island of Chios. Their design was to purchase the Œnessian islands, which belonged to the Chians, and settle there. But the Chians, jealous of losing their trade, refused: so they put to sea again, and having taken Phocæa by surprise, put all the Persians in it to the sword. They next went to Corsica, but great part of them returned very soon. They then lived in subjection either to the Persians, or tyrants of their own. Among the latter we find mention made of Laodamus, who attended Darius Hystaspis in his expedition against the Scythians; and of Dionysius, who, joining Aristagoras, tyrant of Miletus, and chief author of the Ionian rebellion, retired, after the defeat of his countrymen, to Phœnicia, where he made an immense booty, seizing on all the ships he met with trading to that country. From Phœnicia he sailed to Sicily, where he committed great depredations on the Carthaginians and Tuscans; but is said never to have molested the Greeks. In the Roman times the city of Phocæa sided with Antiochus the Great; whereupon it was besieged, taken, and plundered, by the Roman general, but allowed to be governed by its own laws. In the war which Aristonicus, brother to Attalus, king of Pergamus, raised against the Romans, they assisted the former to the utmost of their power; which so highly displeased the senate that they commanded the town to be demolished, and the whole race of the Phocæans to be exterminated. But the Massilienses interposed, and, with difficulty, assuaged the anger of the senate. Pompey declared Phocæa a free city, and restored the inhabitants to all their privileges; whence, under the first emperors, it was reckoned one of the most flourishing cities of all Asia Minor. It is now called Fochia.

PHOCAICUS, a name given to Marcellus. Lucan.

PHOCAS, a Roman centurion, who was made emperor by the army, and crowned at Constantinople about A. D. 603. The emperor Mauritius deserted, fled to Chalcedon with his five children, whom Phocas caused to be inhumanly murdered before his eyes, and then he murdered Mauritius himself, his brother, and several others who were attached to him. Phocas now sent his own image, and that of his wife Leontia, to Rome. Gregory the Great, then bishop of Rome, caused the images to be lodged in the oratory of the martyr Cæsarius, and wrote congratulatory letters to the usurper. As soon as the murder of Mauritius was known, however, Narses, who

commanded the troops on the frontiers of Persia, revolted. Yet Phocas managed matters so as to gain him over to his interest, and then treacherously burnt him alive. By his cruelty Phocas soon became generally hated; for he spared neither sex nor age; amongst others he murdered Constantina the widow of Mauritius, and her daughters. In 609 a conspiracy was formed against him, but was discovered, and the persons concerned in it put to death. In 610, however, he was overtaken by the fate he had so long deserved. Heraclius, the son of Heraclius governor of Africa, being acknowledged as emperor by the people of Africa, sailed thence with a formidable fleet, and a powerful army, for Constantinople, where he defeated the tyrant's fleet. Phocas took refuge in the palace; but one Photinus, whose wife he had debauched, pursuing him, forced the gates, dragged the cowardly emperor from the throne, and having stripped him of the imperial robes, and clothed him with a black vest, carried him in chains to Heraclius, who commanded his hands and feet, then his arms, and at last his head, to be cut off; his body was then delivered to the soldiers, who burnt it in the forum. Such was the end of this cruel tyrant, after he had reigned seven years and some months.

PHOCENIC ACID, in chemistry, according to M. Chevreul, the principle of the soap of several fish oils. Its specific gravity is 0·932; it is colorless, and takes 100 parts of water to dissolve 5·5 parts of it. It is soluble in alcohol in every proportion. Its constituents are in vol. 3 of oxygen; 10 of carbon; and 14 of hydrogen. 100 of phocenic acid neutralise 82·77 of barytes, forming a salt soluble in its own weight of water at 68° of Fahrenheit. The smell of leather dressed with fish oil is ascribed to the decomposition of this acid with the oil.

PHOCIUM, in architecture, the name of an edifice in which were held assemblies of the deputies from all the Phocæan towns. It was situated near the city of Daulis in Phocis. Pausanias gives a description of this building in the fifth chapter of his tenth book. It was a vast structure, the two longest sides of which were ornamented interiorly with porticoes, which served to support the roof as well as to embellish the building. Under these porticoes were benches elevated a little above the level of the floor, and destined for the accommodation of the deputies. The side immediately fronting the entrance was adorned with statues of Jupiter, Juno, and Minerva; the former seated on his throne, the two latter each on one side of him.

PHOCICUM BELLUM, the Phocian or sacred war carried on by the Thebans and Philip II. against the Phocians, for plundering the temple of Apollo at Delphi. See MACEDON and PHOCIS.

PHOCION, a distinguished Athenian general and orator in the time of Philip II. of Macedon. He was too modest to solicit command, though, either as a soldier, orator, statesman, or general, he was by far the most eminent Athenian of his time. As a most disinterested patriot, he could entertain no affection for Philip; but as he knew the disposition of his countrymen, and how unlikely they were to support measures necessary to humble the Macedonian power, he chose rather to cultivate the esteem which Philip showed for the state of Athens, as a means of preserving her, when she should be reduced to that situation which he conceived they wanted virtue to prevent. See MACEDON. He was, however, appointed to command the army which was sent to assist the Byzantines against Philip, whom he obliged to return to his own dominions. This truly great man, whom (though extremely poor) no sum offered by Philip or Alexander could bribe to betray his country, and who on all occasions gave them sound advice, was at length accused by his ungrateful countrymen. He was sent to Athens by Polyperchon, head of a faction in Macedonia, with his friends, chained, in carts, with this message, 'That though he was convinced they were traitors, yet he left them to be judged by the Athenians as a free people.' This happened A. A. C. 318. They were all in a summary manner condemned to death, viz. Phocion, Nicocles, Aheudippus, Agamon, and Pythocles, who were present: Demetrius Phalereus, Callimedon, Charicles, and others, were condemned in their absence. The spleen of his enemies was not extinguished with his life; they decreed that his corpse should be banished the Athenian territories. When the Athenians, however, began to cool, and remember the many services they had received from Phocion, they decreed him a statue of brass, ordered his bones to be brought back at the public expense, and decreed that his accusers should be put to death.

PHOCIS, a country of Greece, between Bœotia on the east, and Locris on the west, extending from the Sinus Corinthiacus on the south, to the sea of Eubœa on the north; and, according to Dionysius, as far as Thermopylæ; but reduced afterwards to narrower bounds (Demost. Strab. Paus.). Its greatest length was from north to south between 38° 45′ and 39° 20′, about thirty-five miles; but not extending thirty miles from east to west, i. e. from 23° 10′ to 23° 40′ at the widest, but about twenty-three miles towards the Corinthian bay, and much narrower still towards the north. It was named from Phocus the son of Ornytion, a native of Corinth; but was soon after invaded by the Æginetæ, under Phocus, the son of Æacus king of Ægina. In Phocis there were many celebrated mountains, particularly Cythæron, Helicon, and Parnassus. Cythæron was consecrated to the Muses, as well as these, and was equally celebrated by the poets. The chief river was the Cephisus, running from the foot of Parnassus, northward, and falling into the Pindus, near the boundary of that kingdom. It had several considerable cities: such as Cyrra, Crissa, and Antecyra, which, according to Ptolemy, were on the sea coasts; and Pythia, Delphia, Daulis, Elatia, Ergosthenia, and Baulia, which were inland towns. Elatia was the largest and richest after Delphi. Daulis was remarkable for the stature and prowess of its inhabitants; and for the tragical events said to have happened in it. See PHILOMELA. Deucalion was king of that part of Phocis which lies about Parnassus at the time that Cecrops I. flourished in Attica; but the Phocians afterwards

formed themselves into a commonwealth, governed by general assemblies chosen from among themselves, and changed frequently. Of the history of the Phocians little is known till the time of the holy war, of which the following was the origin:—The Phocians having presumed to plough the territories of the city of Cyrra, consecrated to the Delphic god, were summoned by the other Grecian states before the court of the Amphictyons, where a considerable fine was imposed upon them for their sacrilege. They refused to pay it, and at the next assembly their dominions were adjudged confiscated to the use of the temple. This exasperated the Phocians still more; who, at the instigation of one Philomelus, seized upon the temple, plundered it of its treasure, and held the sacred depositum for a considerable time. This gave rise to the Phocian or holy war, wherein Athens, Sparta, and some others of the Peloponnesian states declared for the Phocians; and the Thebans, Thessalians, Locrians, and others, against them. The war being ended, the grand council assembled, and imposed an annual fine of sixty talents upon the Phocians, to be paid to the temple, and continued till they had fully repaired the damage it had sustained, and, till this reparation should be made, they were excluded from dwelling in walled towns, and from having any vote in the grand assembly. They did not, however, continue long under this heavy sentence: their known bravery made their assistance so necessary to the rest that they were glad to remit it; after which remission they continued to behave with their usual courage and resolution, and soon obliterated their former guilt.

PHOCUS, the name of three ancient Grecians: 1. The founder; and, 2. the first invader of Phocis; which last was the son of Æacus by Psamathe, one of the Nereids, and brother of Peleus and Telamon; who killed him: 3. The son of the celebrated Phocion, who avenged his father's death, but never did any other memorable action.

PHŒBE, in mythology, 1. A name of Diana: 2. A daughter of Leucippus, brother of Tyndarus, king of Sparta, by Philodice, the daughter of Inachus. She and her sister Hilaria, were betrothed to their cousins Lynceus and Idas but were carried off and married by their other cousins, Castor and Pollux.

PHŒBEUM, a town of Laconiar, near Sparta.

PHŒBIDAS, a Spartan general sent to assist the Macedonians against the Thracians. He seized the citadel of Thebes, for which act of perfidy the Spartans, instead of rewarding, disgraced and banished him, though they still retained the citadel. (C. Nepos.) He died A. A. C. 377.

PHŒBUS, one of the names given by ancient mythologists to the Sun, Sol, or Apollo. See Apollo.

PHŒMOS, a lake of Arcadia. Lempr.

PHŒNICE, an ancient town of Epirus. Livy, xxix. c. 12.

Phœnice, or Phœnicia, the ancient name of a country lying between 34° and 36° of N. lat.; bounded by Syria on the north and east, by Judea on the south, and by the Mediterranean on the west. Some derive the name from one Phœnix; others from φοινιξ, the palm or date, as these trees abounded in this country. Some suppose that Phœnice is originally a translation of the Hebrew word Edom, from the Edomites who fled thither in the days of David. By the contraction of Canaan it was also called Cana, and anciently Raabothin and Colpitis. The Jews commonly called it Canaan; though some part of it they knew by the name of Syrophœnice Bochart tells us that the most probable etymology is Phene Anak, i. e. 'the descendants of Anak.' Such were the names peculiar to this small country; though Phœnice was sometimes extended to all the maritime countries of Syria, Judea, and Canaan, to the Philistines, and even to the Amalekites. But these two names, and the rest, were most generally swallowed up by those of Palestine and Syria. There is some disagreement among authors with respect to the northern limits of this country. Ptolemy makes the river Eleutherus the boundary of Phœnice on the north; but Pliny, Mela, and Stephanus, place it in the island of Aradus, north of that river. Strabo observes that some will have the river Eleutherus to be the boundary of Seleucis, on the side of Phœnice and Cœlosyria. On the coast of Phœnice, and south of the Eleutherus, stood the following cities:—Simyra, Orthosia, Tripolis, Botrys, Byblus, Palæbyblus, Berytus, Sidon, Sarepta, Tyrus, Palætyrus. Phœnice extended, according to Ptolemy, even beyond mount Carmel; for that geographer places in Phœnice, not only Ecdippa and Ptolemais, but Sycaminum and Dæra, which stand south of that mountain. These however, properly speaking, belonged to Palestine. We will not attempt to mark out the bounds of the midland Phœnice. Ptolemy reckons in it the following towns:—Arca, Palæbyblus (Old Byblus), Gabala, and Cæsaria Paniæ. This province was considerably extended in the times of Christianity: when, being considered as a province of Syria, it included both Damascus and Palmyra. The soil is good, and productive of many necessaries for food and clothing. The air is wholesome and the climate agreeable. It is plentifully watered by small rivers; which, running down from mount Libanus, sometimes swell to an immoderate degree, either increased by the melting of the snows on that mountain, or by heavy rains. Upon these occasions they overflow, to the great danger and hinderance of the traveller and damage of the country. Among these rivers is that of Adonis.

Of their civil laws we have no system. With regard to religion, the Phœnicians were the most gross and abominable idolaters. Baal-berith, Baalzebub, Baalsamen, &c., mentioned in Scripture, were some of the Phœnician gods; as were also Moloch, Ashtaroth, and Thammuz. The chief deity was named Baal, or Baal-samen; whom the Hebrews called Baal-shemim, or the god of heaven. See Baal. Diodorus Siculus says, their chief deity was that of Carthage, Chronus, or Saturn. The sacrifices offered up to him were children of the best families. Our author also tells us that the Carthaginians had a

brazen statue or colossus of this god, the hands of which were extended in act to receive, and bent downwards in such a manner, that the child laid thereon immediately fell down into a hollow where there was a fiery furnace. He adds, also, that this inhuman practice seemed to confirm a tradition handed down to the Greeks from very early antiquity, viz. that Saturn devoured his own children. The goddess Cœlestis, or Urania, was held in the highest veneration by the Carthaginians. She is thought to have been the same with the queen of heaven mentioned in Jeremiah, the Juno Olympia of the Greeks. Besides these, there were several other deities of later dates, who were worshipped among the Phœnicians, particularly those of Tyre, and consequently among the Carthaginians also. These were Jupiter, Apollo, Mars, and Bacchus. Jupiter was worshipped under the name of Belus or Baal. To him they addressed their oaths. The same name was also given to the other two, whence they were frequently mistaken for one another. Apollo, or the sun, went either by this name simply, or by others of which Baal made a part. Astarte, or Ashtaroth, was also a chief goddess of the Phœnicians. See ASHTAROTH, and POLYTHEISM. Herodotus supposes the Phœnicians to have been circumcised; but Josephus asserts that none of the nations included under the vague name of Palestine and Syria used that rite, the Jews excepted. They abstained, however, from the flesh of swine. Much is said of their arts, sciences, and manufactures; but in general terms only. The Sidonians, who were a branch of the Phœnicians, were of most happy genius. They were early addicted to philosophical exercises; insomuch that Moschus, a Sidonian, taught the doctrine of atoms before the Trojan war: and Abomenus of Tyre puzzled Solomon by his questions.

Phœnice continued to be one of the seats of learning, and both Tyre and Sidon produced their philosophers of later ages; namely, Bœthus and Diodatus and Sidon, Antipater and Apollonius of Tyre, who gave an account of the writings and disciples of Zeno. As to their manufactures, the glass of Sidon, the purple of Tyre, and the exceedingly fine linen they wove, were the produce of their own country, and their own invention; and for their extraordinary skill in working metals, in hewing timber and stone; in a word, for their perfect knowledge of what was solid, great, and ornamental in architecture —we need only mention the large share they had in erecting and decorating the temple of Solomon at Jerusalem. Their fame for taste, design, and ingenious invention, was such, that whatever was elegant, great, or pleasing in apparel, vessels, or toys, was distinguished by the epithet of Sidonian. The Phœnicians were likewise celebrated as merchants, navigators, and planters of colonies in foreign parts. As merchants, they may be said to have engrossed all the commerce of the western world: as navigators, they were the boldest, the most experienced, and greatest discoverers of the ancient times: they had for many ages no rival. In planting colonies they exerted themselves so much, that, considering their habitation was little more than the slip of ground between Mount Libanus and the sea, it is surprising how they could furnish such supplies of people, and not wholly depopulate their own country. It is generally supposed that the Phœnicians were induced to deal in foreign commodities by their neighbourhood with the Syrians; and that, from their example, they turned their thought to trade and navigation, and by an uncommon application soon eclipsed their masters in that art. The whole thoughts of the Phœnicians were employed on schemes to advance their commerce. They affected no empire but that of the sea; and seemed to aim at nothing but the peaceable enjoyment of their trade. This they extended to all the known parts they could reach; to the British isles, commonly understood by the Cassiterides; to Spain and other places in the ocean, both within and without the Straits of Gibraltar; and, in general, to all the ports of the Mediterranean, the Black Sea, and the Lake Mæotis. In all these parts they had settlements and correspondents, from which they drew what was useful to themselves, or might be so to others; and thus they exercised the three great branches of trade; importation, exportation, and transportation. Such was their trade by sea; and for that which they carried on by land in Syria, Mesopotamia, Assyria, Babylonia, Persia, Arabia, and India, it was of no less extent, and may give us an idea of what this people once was, how rich, and how deservedly their merchants are mentioned in Scripture as equal to princes. Their country was at that time the great warehouse where every thing that might either administer to the necessities or luxury of mankind was to be found; which they distributed as they judged would be best for their own interest. As to their navigation, their larger embarkations were of two sorts; they divided them into round ships or gauli; and long ships, galleys, or triremes. When they drew up in line of battle, the gauli were disposed at a small distance from each other in the wings, or in the van and the rear; their triremes were contracted together in the centre. To discourage other nations from engaging in commerce, they practised piracy, and thus grasped at the whole commerce of the then known world. They also very early applied astronomy to navigation.

PHŒNICOPTERUS (probably from φοινιξ, red), the flamingo, in ornithology, a genus of birds belonging to the order of grallæ. The beak is naked, teethed, and bent as if it were broken; the nostrils are linear; the feet are palmated, and four-toed. There is but one species, viz.

P. Bahamensis of Catesby, a native of Africa and America. This species resembles the heron in shape, excepting the bill, which is of a very singular form. It is two years old before it arrives at its perfect color; and then it is entirely red, excepting the quill feathers, which are black. A full grown one is of equal weight with a wild duck; and when it stands erect it is five feet high. The feet are webbed. The flesh is delicate, and mostly resembles that of a partridge in taste. The tongue, above any other part, was in the highest esteem with the luxurious Romans.

Dat mihi rubens penna nomen, sed lingua gulosis
Nostra sapit. *Mart.* l. 13. epig. 66.

These birds make their nests on hillocks in shallow water; on which they sit with their legs extended down, like a man sitting on a stool. They breed on the coast of Cuba and the Bahama islands, and frequent salt water only. By the particular shape of its bill, this bird, in eating, twists its neck from side to side, and makes the upper mandible touch the ground. They are very stupid, and will not rise at the report of a gun; nor is it any warning to those who survive that they see others killed by their side; so that, by keeping himself out of sight, a fowler may kill as many as he pleases. In the old continent they are not often met with beyond lat. 40° N. or S. But they are found every where on the African coast and adjacent isles, to the Cape of Good Hope; and sometimes on the coast of Spain, Italy, and those of France, lying on the Mediterranean; at Marseilles, and for some way to the Rhone. In some seasons they frequent Aleppo and the parts adjacent. They are seen also on the Persian side of the Caspian Sea, and thence along the west coast as far as the Wolga; though this is at uncertain times, and chiefly in considerable flocks coming from the north-east mostly in October and November: but, so soon as the wind changes, they totally disappear. They breed in the Cape Verd Isles, particularly in that of Sal. They are also common in the warm parts of America, as Peru, Chili, Cayenne, Brasil, and the various islands of the West Indies. Sloane found them in Jamaica, at the Bahama Islands, and Cuba, where they breed. Their food chiefly consists of small fish or their eggs; and of water insects, which they search after, by plunging in the bill and part of the head. Whilst feeding, one of them is said to stand sentinel, and the moment he sounds the alarm, the whole flock takes wing. This bird, when at rest, stands on one leg, the other being drawn up close to the body, with the head placed under the wing on that side of the body it stands on. They are sometimes caught young, and are brought up tame; but are always impatient of cold; and seldom live in this state.

PHŒNICUSA, one of the Æolian Islands; now called Felicudi.

PHŒNIGMUS (from φοινιξ, red), in medidicine, 1. A redness of the skin, such as is produced by stimulating substances. 2. That which reddens the skin when applied to it.

PHŒNISSA, a patronymic of Dido. Virg.

PHŒNIX, son of Amyntor, king of Argos, by Cleobule or Hippodamia, was preceptor to young Achilles. His father having proved faithless to his wife, through fondness for a concubine called Clytia, Cleobule persuaded her son Phœnix to ingratiate himself with his father's mistress. Phœnix easily succeeded; but Amyntor, discovering his intrigues, pronounced a curse upon him, and the son was soon after deprived of his sight by divine vengeance. Some say that Amyntor himself put out his son's eyes, which so provoked him that he meditated the death of his father. Piety, however, prevailed over passion; and, that he might not become a parricide, Phœnix fled from Argos to the court of Peleus, king of Phthia. Here he was treated with tenderness; Peleus carried him to Chiron, who restored him to his eye-sight; soon after which he was made preceptor to Achilles, his benefactor's son. He was also presented with the government of many cities. He went with his pupil to the Trojan war. After the death of Achilles, Phœnix, with others, was commissioned by the Greeks to return into Greece, to bring to the war young Pyrrhus. This commission he successfully performed; and, after the fall of Troy, he returned with Pyrrhus, and died in Thrace. He was buried, according to Strabo, near Trachinia, where a small river in the neighbourhood received the name of Phœnix.

PHŒNIX, the son of Agenor, by a nymph, who was called Telephassa, according to Apollodorus and Moschus, or, according to others, Epimidusa, Perimeda, or Agriope. He was, like his brother Cadmus, and Ciux, sent by his father in pursuit of his sister Europa, whom Jupiter under the form of a bull had carried away; and, when his enquiries proved unsuccessful, he settled in a country, which was from him called Phœnicia. From him also the Carthaginians were called Pœni.

PHŒNIX, in astronomy, one of the new southern constellations. See ASTRONOMY.

PHŒNIX, in botany, the great palm, or date tree; a genus of plants belonging to the order of palmæ. There is only one species, viz.

P. dactylifera, the date tree, a native of Africa and the eastern countries, where it grows to fifty, sixty, and 100 feet high. The trunk is round, upright, and studded with protuberances, which are the vestiges of the decayed leaves. From the top issues forth a cluster of leaves or branches eight or nine feet long, extending all round like an umbrella, and bending a little towards the earth. The bottom part produces a number of stalks like those of the middle, but seldom shooting so high as four or five feet. These stalks, says Adanson, diffuse the tree very considerably; so that, wherever it naturally grows in forests, it is extremely difficult to open a passage through its prickly leaves. The date tree was introduced into Jamaica soon after the conquest of the island by the Spaniards. There are, however, but few of them there at this time. The fruit is somewhat in the shape of an acorn. It is composed of a thin, light, and glossy membrane, rather pellucid and yellowish; which contains a fine pulpy fruit, which is firm, sweet, and somewhat vinous to the taste, esculent, and wholesome; within this is enclosed a solid, tough, and hard kernel, of a pale gray color on the outside, and finely marbled within like the nutmeg. For medicinal use dates are to be chosen large, full, fresh, yellow on the surface, soft and tender, not too much wrinkled; such as have a vinous taste, and do not rattle when shaken. They are produced in many parts of Europe, but never ripen perfectly there. The best are brought from Tunis; they are also very fine and good in Egypt, and in many parts of the east. Those of Spain and France look well; but are never perfectly ripe, and very subject to decay. They are preserved three different ways; some pressed and dry; others pressed more moderately, and again

moistened with their own juice; and others not pressed at all, but moistened with the juice of other dates, as they are packed up, which is done in baskets or skins. Those preserved in this last way are much the best. Dates have always been esteemed moderately strengthening and astringent. Though the date tree grows every where indiscriminately on the northern coasts of Africa, it is not cultivated with care, except beyond Mount Atlas; because the heat is not sufficiently powerful along the coasts to bring the fruits to maturity. Still even here the date tree supplies the deficiency of corn to the inhabitants of these countries, and furnishes them with almost the whole of their subsistence. They have flocks of sheep; but, as they are not numerous, they preserve them rather for the sake of their wool than their flesh, which is very unwholesome food in countries that are excessively warm.

The date trees are planted without order, twelve feet distant from each other, near rivulets and streams. Forests of them may be seen here and there of several leagues in circumference; their extent depending upon the quantity of water which can be procured to water them. These forests are intermixed with orange, almond, and pomegranate trees, and with vines which twist round the trunks of the dates; the heat is strong enough to ripen the fruit, though they are never exposed to the sun. Care is taken to till the earth well, and to raise, in many cases, a circular border around the root of each tree, that the water may remain longer and in larger quantity. The trees are watered at all seasons, but more particularly during the heats of summer. In winter, new plantations are formed. For this purpose, those who cultivate them take shoots of those which produce the best dates, and plant them at a small distance one from the other. At the end of three or four years these shoots begin to bear fruit: but this is as yet dry, without sweetness, and even without kernels; they never reach the highest degree of perfection of which they are susceptible till they are about fifteen or twenty years old. These plants are, however, produced from the seeds taken out of the fruit, provided they are fresh. They should be sown in pots filled with light rich earth, and plunged into a moderate hot-bed of tanners' bark, which should be kept in a moderate temperature of heat, and frequently watered. When the plants are come up to a proper size, they should be each planted in a separate small pot, filled with the same light earth, and plunged into a hot-bed again, observing to refresh them with water, as also to let them have air in proportion to the warmth of the season and the bed in which they are placed. During the summer they should remain in the same hot-bed; but, in the beginning of August, they should have a great share of air to harden them against the approach of winter; for, if they are too much forced, they will be so tender as not to be preserved through the winter without much difficulty, especially if there is not a bark stove to keep them in. The soil in which these plants should be placed must be composed in the following manner; viz. half of light fresh earth taken from a pasture ground, the other half sea-sand and rotten dung, or tanners' bark in equal proportion; these should be carefully mixed, and laid in a heap three or four months at least before it is used; but should be often turned over to prevent the growth of weeds, and to sweeten the earth. The trees, however, which spring from seed, never produce so good dates as those that are raised from shoots; they being always poor and ill tasted. It is undoubtedly by force of cultivation, and after several generations, that they acquire a good quality. The date trees which have been originally sown grow rapidly, and bear fruit in the fourth or fifth year. Care is taken to cut the inferior branches of the date tree in proportion as they rise; and a piece of the root is always left, of some inches in length, which affords the easy means of climbing to the summit. These trees live a long time, according to the account of the Arabs; who say that, when they have attained to their full growth, no change is observed in them for the space of three generations.

The number of females which are cultivated is much superior to that of the males, because they are much more profitable. The sexual organs of the date tree grow upon different stalks, and these trees flower in April and May, when the Arabs cut the male branches to impregnate the females. For this purpose they make an incision in the trunk of each branch which they wish to produce fruit, and place in it a stalk of male flowers; without this precaution the date tree would produce only abortive fruit. In some districts the male branches are only shaken over the female. This practice of impregnating the date tree is very ancient. Pliny describes it accurately in that part of his work where he treats of the palm. There is scarcely any part of the date tree which is not useful. The wood, though of a spongy texture, lasts such a number of years that the inhabitants of the country say it is incorruptible. They employ it for making beams and instruments of husbandry; it burns slowly, but the coals which result from its combustion are very strong, and produce a great heat. The Arabs strip the bark and fibrous parts from the young date trees, and eat the substance, which is in the centre; it is very nourishing, and has a sweet taste; it is known by the name of the marrow of the date tree. They eat also the leaves, when they are young and tender, with lemon juice; the old ones are laid out to dry, and are employed for making mats, and other works of the same kind, which are much used, and with which they carry on a considerable trade in the interior parts of the country. From the sides of the stumps of the branches which have been left arise a great number of delicate filaments, of which they make ropes, and which might serve to fabricate cloth. Of the fresh dates and sugar, says Hasselquist, the Egyptians make a conserve, which has a very pleasant taste. In Egypt they use the leaves as fly-flaps, for driving away the numerous insects which prove so troublesome in hot countries. The hard boughs are used for fences and other purposes of husbandry; the principal stem for building. The fruit, before it is ripe, is somewhat astringent; but, when thoroughly mature, is of the nature of the fig. The Senegal dates are shorter

than those of Egypt, but much thicker in the pulp, which is said to have a sugary agreeable taste, superior to that of the best dates of the Levant. A white liquor, known by the name of milk, is drawn also from the date tree. To obtain it, all the branches are cut from the summit of one of these trees, and, after several incisions have been made in it, they are covered with leaves, in order that the heat of the sun may not dry it. The sap drops down into a vessel placed to receive it, at the bottom of a circular groove, made below the incisions. The milk of the date tree has a sweet and agreeable taste when it is new; it is very refreshing, and it is even given to sick people to drink, but it generally turns sour in twenty-four hours. Old trees are chosen for this operation, because the cutting of the branches, and the large quantity of sap which flows from them, greatly exhaust them, and often cause them to decay. The male flowers of the date tree are also useful. They are eaten when still tender, mixed up with a little lemon juice. They are reckoned to be very provocative: the odor which they exhale is probably the cause of this property being ascribed to them. These date trees are very lucrative to the inhabitants of the desert. Some of them produce twenty bunches of dates; but care is always taken to lop off a part of them, that those which remain may become larger; ten or twelve bunches only are left on the most vigorous trees. It is reckoned that a good tree produces, one year with another, about the value of ten or twelve shillings to the proprietor. A pretty considerable trade is carried on with dates in the interior part of the country, and large quantities of them are exported to France and Italy. The crop is gathered towards the end of November. When the bunches are taken from the tree, they are hung up in some very dry place, where they may be sheltered and secure from insects. Dates afford wholesome nourishment, and have a very agreeable taste when they are fresh. The Arabs eat them without seasoning. They dry and harden them in the sun, to reduce them to a kind of meal, which they lay up in store to supply themselves with food during the long journeys which they often undertake across their deserts. This simple food is sufficient to nourish them for a long time. The inhabitants of the Zaara procure also from their dates a kind of honey which is exceedingly sweet. For this purpose they choose those which have the softest pulp; and, having put them into a large jar with a hole in the bottom, they squeeze them by placing over them a weight of eight or ten pounds. The most fluid part of the substance, which drops through the hole, is what they call the honey of the date. Even the stones, though very hard, are not thrown away. They give them to their camels and sheep as food, after they have bruised them, or laid them to soften in water. The date, as well as other trees which are cultivated, exhibits great variety in its fruit, with respect to shape, size, quality, and even color. There are reckoned to be at least twenty different varieties. Dates are very liable to be pierced by worms, and they soon corrupt in moist or rainy weather.

Phœnix, in ornithology, a fabulous bird of antiquity. The ancients speak of this bird as single, or the only one of its kind; they describe it as of the size of an eagle; its head finely crested with a beautiful plumage, its neck covered with feathers of a gold color, and the rest of its body purple, only the tail white, and the eyes sparkling like stars; they say that it lives above 500 years in the wilderness; that, when thus advanced in age, it builds itself a pile of sweet wood and aromatic gums, and fires it with the wafting of its wings, and thus burns itself; and that from its ashes arises a worm, which in time grows up to be a phœnix. Hence the Phœnicians gave the name of phœnix to the palm tree; because, when burnt down to the root, it rises again fairer than ever. In the sixth book of the Annals of Tacitus, sect. 28, it is observed that, in the year of Rome 787, the phœnix revisited Egypt; which occasioned among the learned much speculation. This bird is sacred to the sun. Of its longevity the accounts are various. The common persuasion is that it lives 500 years; though by some the period is extended to 1461. But Ausonius makes it no less than 69,984 years! Eidyl. 18. The several eras when the phœnix has been seen are fixed by tradition. The first was in the reign of Sesostris; the second in that of Amasis; and, in the period when Ptolemy III. was on the throne of Egypt, another phœnix directed its flight towards Heliopolis. When to these circumstances are added the brilliant appearance of the phœnix, and the tale that it makes frequent excursions with a load on its back, and that when, by having made the experiment through a long tract of air, it gains sufficient confidence in its own vigor, it takes up the body of its father and flies with it to the altar of the sun to be there consumed; it seems probable that the learned of Egypt had enveloped under this allegory the philosophy of comets.

Phœnix, a river in Trachina.

PHOLAS, a genus of insects belonging to the order of vermes testacea. The shell is double-valved and divaricated; the cardo is turned backwards, and connected by a cartilage. There are six species, distinguished by the figures of their shells. The name pholas is derived from the Greek, and signifies something which lies hid. This name they derive from their property of making themselves holes in the earth, sand, wood, or stone, and living in them. The means of their getting there, however, is unknown. They must have penetrated these substances when very small; because the entrance of the hole in which the pholas lodges is always much less than the inner part of it, and indeed than the shell of the pholas itself. Hence some have supposed that they were hatched in holes accidentally formed in stones, and that they naturally grew of such a shape as was necessary to fill the cavity. The holes in which the pholades lodge are usually twice as deep, at least, as the shells themselves are long. The openings of these holes are what betray the pholas being in the stone; but they are always very small in proportion to the size of the fish. There seems to be no progressive motion of any animal in nature so slow as that of the pholas; it is immersed in

the hole, and nas no movement except a small one towards the centre of the earth; and this is only proportioned to the growth of the animal. Its work is very difficult in its motion; but it has great time to perform it in, as it only moves downward, sinking itself deeper in the stone as it increases in bulk. That part by means of which it performs this is a fleshy substance placed near the lower extremity of the shell; it is of the shape of a lozenge, and is considerably large in proportion to the size of the animal; and, though it be of a soft substance, it is not to be wondered at that in so long a time it is able, by constant work, to burrow into a hard stone. How they perform this may be seen by taking one of them out of the stone, and placing it upon clay; for they will immediately get to work in bending and extending that part allotted to dig for them, and in a few hours they will bury themselves in the mud in as large a hole as they had taken many years to make in the stone. They find little resistance in so soft a substance; and the necessity of their hiding themselves evidently makes them hasten their work. The animal is lodged in the lower half of the hole in the stone, and the upper half is filled up by a pipe of a fleshy substance and conic figure, truncated at the end: this they usually extend to the orifice of the hole, and place on a level with the surface of the stone; but they seldom extend it any farther than this. The pipe, though it appears single, is in reality double, or at least it is composed of two parts separated by a membrane. The use of this pipe or proboscis is the same with that of the proboscis of other shell-fish, to take in sea-water into their bodies, and afterwards to throw it out again. In the middle of their bodies they have a small green vessel, the use of which has not yet been discovered. This, when plunged in spirit of wine, becomes of a purple color; but its color on linen will not become purple in the sun like that of the murex; and, even if it would, its quantity is too small to make it worth preserving.

The pholas is remarkable for its luminous quality, which was noticed by Pliny, who observes that it shines in the mouth of the person who eats it; if it touch his hands or clothes it makes them luminous; and that its light depends upon its moisture. Reaumur observes, that whereas other fishes give light when they tend to putrescence, this is more luminous in proportion to its being fresh; that when dried, its light will revive if it be moistened either with fresh or salt water, but that brandy immediately extinguishes it. He endeavoured to make this light permanent, but none of his schemes succeeded. The attention of the Bolognian academicians was engaged to this subject by M. F. Marsilius in 1724, who brought a number of these fishes, and the stones in which they were enclosed, to Bologna, on purpose for their examination. Beccarius observed, that though this fish ceased to shine when it became putrid, yet that in its most putrid state it would shine, and make the water in which it was immersed luminous when it was agitated. Galeatius and Montius found that wine or vinegar extinguished this light; that in common oil it continued some days, but in rectified spirit of wine or urine hardly a minute. To discover in what manner this light was affected by different degrees of heat, they made use of a Reaumur's thermometer, and found that water rendered luminous by these fishes increased in light till the heat arrived at 45°, but that it then became suddenly extinct, and could not be revived again. In the experiments of Beccarius, a solution of sea-salt increased the light of the luminous water; a solution of nitre did not increase it quite so much. Sal ammoniac diminished it a little, oil of tartar per deliquium nearly extinguished it, and the acids entirely. This water poured upon fresh calcined gypsum, rock crystal, ceruse, or sugar, became more luminous. He also tried the effects of it when poured upon various other substances, but there was nothing very remarkable in them. Afterwards, using luminous milk, he found that oil of vitriol extinguished the light, but that of tartar increased it. He had the curiosity to try how differently colored substances were affected by this kind of light; and having, for this purpose, dipped several ribands in it, the white came out the brightest, next to this was the yellow, and then the green; the other colors could hardly be perceived. It was not, however, any particular color, but only light, that was perceived in this case. He then dipped boards painted with the different colors, and also glass tubes filled with substances of different colors, in water rendered luminous by the fishes. In both these cases, the red was hardly visible, the yellow was the brightest, and the violet the dullest. But, on the boards, the blue was nearly equal to the yellow, and the green more languid; whereas in the glasses the blue was inferior to the green. Of all the liquors into which he put the pholades, milk was rendered the most luminous. A single pholas made seven ounces of milk so luminous that the faces of persons might be distinguished by it, and it looked as if transparent. Air appeared to be necessary to this light; for, when Beccarius put the luminous milk into glass tubes, no agitation would make it shine unless bubbles of air were mixed with it. Montius and Galeatius found, that, in an exhausted receiver, the pholas, lost its light, but the water was sometimes made more luminous; which they ascribed to the rising of bubbles of air through it. Beccarius, as well as Reaumur, tried many schemes to render the light of these pholades permanent. For this purpose he kneaded the juice into a kind of paste with flour, and found that it would give light when it was immersed in warm water; but it answered best to preserve the fish in honey. In any other method of preservation, the property of becoming luminous would not continue longer than six months, but in honey it had lasted above a year; and then it would, when plunged in warm water, give as much light as ever. See Barbut's Genera Verminum, p. 14, &c.

The Memoirs of the Academy of Sciences (Savans Etrang. tom. iii. p. 267) contain the observations of Godeheu de Riville on two minute marine animals, which Latreille regards as falling under the genus lynceus of Muller, one of the many generic branches of the Linnæan monoculus; but whose habits are so similar to

those of the pholas that a description of them will be interesting here.

'Among the various phenomena,' says the author alluded to, 'of which the causes are still almost unknown, that starry brightness, which we so often perceive in the slightly agitated waters of the ocean, greatly merits the attention of those who have a taste for physics; but I have not yet read any thing satisfactory on the subject, as writers seem to have satisfied themselves rather with conjectural reasons, than by making experiments to ascertain the real origin of this natural phosphorus.' In a voyage made by our author to the East Indies, he was enabled to make the following observations:—'About nine in the evening of the 14th of July 1754, being in N. lat. 8° 47′, and E. long. 73°, from Paris, he was informed that the sea appeared like a sheet of fire. Every portion of its surface, when gently agitated, broke into a thousand stars. Each wave which coursed along the side of the vessel spread out a pure, shining, silvery light. The more distant swelling of the waters presented the appearance of a moving plain covered with snow and the wake of the vessel was of a clear and luminous white, sprinkled over with brilliant spots of azure light (azurés).

'Anxious,' he continues, 'to consider a spectacle, to me alike novel and interesting, I was struck by the light shed by certain small bodies, which frequently remained attached to the helm, when the sea for a moment retired; and, without listening to all that was said regarding the supposed cause of the phenomenon, I ordered a bucket of water to be drawn up, and filtered into a basin through a fine linen handkerchief. After this operation, I observed that the filtered water was no longer luminous, but that the handkerchief was covered with many brilliant points. Some of these I raised on the end of my finger, and found that they had a certain consistence as animal bodies; being thus exposed, they gradually lost their brightness, and as they resembled the eggs or spawn of fishes, in form and dimensions, I at first yielded to the belief, which was pressed upon me, that they actually were so. Being anxious to examine one in a clear light, and placed under a strong magnifying glass, I was surprised to observe a sensible movement in its interior. Being doubtful of what I saw, I turned it in many directions, placing it on my nail in the centre of a drop of water. But what was my surprise when I perceived it became surrounded by a brilliant fluid, perceptible to all those who were in the cabin, as well as to myself. On this I did not fail to pursue my observations, and, having drawn up a greater quantity of water, I caused it to be filtered as before, and immersed the handkerchief, which had served for that purpose, into a basin of the pure sea water. I then instantly perceived a considerable number of small insects swimming about with celerity, which, at first sight, bore a resemblance to those commonly called in France puces d'eau, or water-fleas. In spite of their agility, I succeeded in arresting one, by entangling it in a hair pencil, fixed against the sides of the goblet: this pressure, though slight, seemed too strong for so delicate a being, it suffered from it, and, notwithstanding the light of two candles, by which we were pursuing our examination, we could perceive issuing from its body a luminous and bluish colored liquid, of which the traces extended in the water to the distance of two or three lines. This accident did not induce me to leave my hold: I raised it up on the point of the pencil, and scarcely was it placed under the microscope, than it again shed forth a quantity of that cerulean liquid. I expected that so great an exertion would have weakened it extremely, but I had again the satisfaction to see it apparently full of life, and stirring about with vivacity.

'It was not in consequence of the examination of a single specimen that I ventured to give its figure under a variety of aspects. The abundance with which I was then surrounded, enabled me to sacrifice many, that I might be assured of all the parts of which they are composed; and I examined several which I found next day rather in a languishing state, but which a change of water reanimated. The brilliant liquid of which they have so ample a reservoir was not even altered; for, having left, during some time, attached to the pencil, one of those which I had destined for examination by the microscope, it spread out a brightness which lasted seven or eight minutes, and was visible, even in full day, to various persons, at the distance of several feet.'

Many of the most lively specimens of these animals having been put into fresh water, very clear, and freed from all disagreeable intermixture, they were immediately precipitated to the bottom, became strongly agitated or convulsed, and died in about six seconds Many of them, while expiring, gave out a quantity of their bright phosphoric fluid. It seemed absolutely necessary, in order that the insect might exert this power, that it should be in a state of humidity. When the moisture was absorbed, none shone even when bruised. Those which Godeheu had withdrawn from the sea, and placed in the same water in which he had found them, died one after another; but the water in which they had been preserved shone with a very lively light. A phosphoric matter, collected in consequence of this observation, did not, however, last for any time. Three days were sufficient to make it lose its luminous property.

This little animal appeared to be enclosed in, or protected by, a scaly covering, or shell. Its general contour might be said to resemble an almond split down one side, and a little sloped at its superior part. The posterior extremity of its body presented many globules, in the form of a moveable group or cluster. These globules are of a bluish-green, which becomes of a tarnished yellow, in proportion as the animal approaches its end. Godeheu perceived in these grains the phosphoric matter with which it is provided. We can scarcely doubt that these minute corpuscles are the eggs, and thence their luminous property is the less surprising, since the eggs of many fishes and of several insects present us with a similar phenomenon. Its superior part is furnished with four moveable antennæ or horns, formed of many articulations, and terminated by tufts of very fine hair. The head is placed in the centre, and armed with some small hooks. Beneath it are two feet, bent, and furnished with

hooks, and lower down there occur other organs of movement.

PHOLIS, in ichthyology, the name of a small anguilliform fish. The back is brown, the belly white, the whole back and sides are spotted, and the skin is soft, free of scales, but with a tough mucilaginous matter like the eel. This species most of all approaches to the alauda; and, though usually larger, yet Ray doubts whether it really differs from it in any thing essential; the distinction is in color, which though a very obvious, is certainly a very precarious one.

PHOLOE, 1. A mountain of Arcadia, near Pisa, so named from Pholus, who was buried in it; 2. Another in Thessaly, near mount Othrys. Plin. iv. 6; Lucan 3.

PHOLUS, in fabulous history, one of the Centaurs, who entertained Hercules, when going against the Erymanthian boar.—Paus. 3, Virg. Æn. 8, 294.

PHONAGOGUS, in music, the principal part or subject of a fugue.

PHONASCUS, among the ancient Greeks, but more particularly the Romans, was a person whose office was, by a certain signal, to admonish the singer or speaker when he was in danger of losing the natural tone of the voice, by overstraining it through the rapidity of his utterance. The emperor Nero ordered a phonascus, without whose presence he neither spoke nor sung, first, to check him when he sung or spoke too loud; and, if his admonition was neglected, to stop his mouth.

PHONICA, from φωνη, the voice. The name of the first order of the class pneumatica, in Good's Nosology. Diseases affecting the vocal avenues. It has six genera, viz. coryza, polypus, rhonchus, aphonia, dysphonia, psellismus.

PHO'NICS, *n. s.* } Gr. φωνη, sound: The doctrine of sounds;
PHONOCAMP'TIC, *adj.* } having the power to inflect or turn a sound.

The magnifying the sound by the polyphonisms or repercussions of the rocks, and other *phonocamptick* objects. *Derham.*

PHONICS, is otherwise called ACOUSTICS. See that article and SOUND.

PHORCUS, or PHORCYS, in mythology, the son of Neptune by Thoossa, who married his sister Ceto, by whom he had the Gorgons, the dragon that kept the gardens of the Hesperides, and other monsters.—Hesiod.

PHORMIO, an Athenian general, who reduced himself to poverty to maintain the dignity of his army. The Athenians paid his debts, and offered to make him head general, which he declined.

PHORMIUM, in botany, a genus of the monogynia order and hexandria class of plants. The most remarkable species is,

P. tenax (of Forster), the flax plant, a plant that serves the inhabitants of New Zealand instead of hemp and flax. Of this plant there are two sorts; the leaves of both resemble those of flags, but the flowers are smaller, and their clusters more numerous; in one kind they are yellow, and in the other a deep red. Of these leaves, with very little preparation, they make common apparel, and their strings, lines, and cordage, for every purpose; said to be much stronger than any thing we make with hemp. From the same plant, by another preparation, they draw long slender fibres, which shine like silk, and are as white as snow: of these, which are very strong, they make their finest cloths; and of the leaves, without any other preparation than splitting them into proper breadths, and tying the strips together, they make their fishing nets, some of which are of an enormous size.

PHORONEUS, in fabulous history, the son of Inachus by Melissa, brother of Io, and the second king of Argos. He married the nymph Laodice, by whom he had Apis and Niobe; civilised his subjects; built a temple to Juno, &c., and after death was worshipped as the god of the river of the same name.

PHORONIS, a patronymic of Io, or Isis.

PHORONIUM, a town of Argolis.

PHOSGENE GAS, so called by its discoverer Dr. John Davy, from its mode of production. Chloro-carbonaceous acid, a combination of carbonic oxide and chlorine, made by exposing a mixture of equal volumes of chlorine and carbonic oxide to the action of light. It has a peculiar pungent odor, is soluble in water, and is resolved into carbonic and muriatic acid gases. See CHEMISTRY, Index.

PHOS'PHOR, *n. s.* } Lat. *phosphorus.* The
PHOS'PHORUS, } morning star; an in-
PHOSPHOR'IC, *adj.* } flammable substance.

Of lambent flame you have whole sheets in a handful of *phosphor.* *Addison.*

Liquid and solid *phosphorus* show their flames more conspicuously, when exposed to the air. *Cheyne.*

Why sit we sad when *phosphorus* shines so clear? *Pope.*

Phosphorus is obtained by distillation from urine putrified, by the force of a very vehement and long-continued fire. *Pemberton.*

When air's pure essence joins the vital flood,
And with *phosphoric* acid dyes the blood,
Your virgin trains the transient heat dispart,
And lead the soft combustion round the heart.
Darwin.

PHOSPHAS, PHOSPHAT, or PHOSPHATE, in chemistry, is a name that has been given to the combination of phosphoric acid with different bases. See PHOSPHATIC, and PHOSPHORIC ACID, and CHEMISTRY, Index.

PHOSPHATE OF YTTRIA is a mineral found in the neighbourhood of Lindenas, Norway, by M. Tank. Its color is yellowish-brown. Specific gravity 4·5577. It is scratched by steel. Fracture foliated in several directions. Externally dull; foliated fracture resinous lustre; transverse, greasy. In minute fragments, semitransparent and yellowish. At the blow-pipe it resembles phosphate of lime. With borax it affords a colorless bead, which becomes milky by cooling. The acids, even when concentrated, do not dissolve it. Its constituents are, by the analysis of Berzelius,

Yttria	62·58
Phosphoric acid, with a little fluoric	33·49
Subphosphate of iron . . .	3·93
	100·00

PHOSPHATIC ACID, in chemistry, is obtained by the slow combustion of cylinders of

phosphorus in the air. For which purpose it is necessary that the air be renewed to support the combustion; that it be humid, otherwise the dry coat of phosphatic acid would screen the phosphorus from farther action of the oxygen; and that the different cylinders of phosphorus be insulated, to prevent the heat from becoming too high, which would melt or inflame them, so as to produce phosphoric acid. The acid, as it is formed, must be collected in a vessel, so as to lose as little of it as possible. All these conditions may be thus fulfilled:—We take a parcel of glass tubes which are drawn out to a point at one end; we introduce into each a cylinder of phosphorus a little shorter than the tube; we dispose of these tubes along-side of one another, to the amount of thirty or forty in a glass funnel, the beak of which passes into a bottle placed on a plate covered with water. We then cover the bottle and its funnel with a large bell-glass, having a small hole in its top, and another in its side. A film of phosphorus first evaporates, then combines with the oxygen and the water of the air, giving birth to phosphatic acid, which collects in small drops at the end of the glass tubes, and falls through the funnel into the bottle. A little phosphatic acid is also found on the sides of the bell-glass, and in the water of the plate. The process is a very slow one. The phosphatic acid thus collected is very dilute. We reduce it to a viscid consistence, says Dr. Ure, by heating it gently; and better still by putting it, at the ordinary temperature, into a capsule over another capsule full of concentrated sulphuric acid, under the receiver of an air-pump, from which we exhaust the air.

The acid thus formed is a viscid liquid, without color, having a faint smell of phosphorus, a strong taste, reddening strongly the tincture of litmus, and denser than water in a proportion not well determined. Every thing leads to the belief that this acid would be solid, could we deprive it of water. When it is heated in a retort, phosphureted hydrogen gas is evolved, and phosphoric acid remains. The oxygen and hydrogen of the water concur to this transformation. Phosphatic acid has no action, either on oxygen gas, or on the atmospheric air at ordinary temperatures. In combining with water, a slight degree of heat is occasioned.

From the experiments of M. Thenard, this acid seems to consist (exclusive of water) of 100 phosphorus united to about 110 oxygen, which is nearly the proportion of three primes phosphorus $= (3 \times 1{\cdot}5)\ 4{\cdot}5 + 5$ oxygen $= 5$.

But 2 prim. phosphorus + 4 ox. = 4 phosphoric acid.
And 1 + 1 = 1 phosphorous acid.

Hence the phosphatic acid would seem to result from the union of 2 primes of phosphoric acid with 1 of phosphoric acid. Now, M. Dulong has shown that the phosphatic acid in its action on the salifiable bases is transformed into phosphorous and phosphoric acids, whence proceed phosphites and phosphates.

Phosphorescence. See Light. In that article we have referred to Dr. Brewster's very complete account of marine phosphorescence in the Edinburgh Philosophical Journal. We may here add:—While examining the distribution of the aggregated groups of the carbonate of lime which forms a great portion of these plants, and which are essential and integral parts of their constitution, Dr. Brewster found that the plants were phosphorescent, when laid upon heated iron so as to display their entire outlines in the dark. He ascertained that each group or mass of the calcareous matter consisted of minute aggregated particles, which possessed double refraction, and had regular neutral and depolarising axes. They are held to the stem of the plant by a very fine transparent membrane. It is surprising that some of our most eminent botanists should have been so much misled as to suppose the calcareous matter to be an accidental deposit from the water in which they vegetate.

Phosphorescence of the sulphates of quinina and cinchonina.— M. Callaude has found that this substance becomes luminous when exposed to a gentle heat. M. Pelletier has likewise discovered that sulphate of cinchonina, both alone and when mixed with the sulphate of quinina, becomes luminous when exposed to the steam of boiling water; but that neither quinina nor cinchonina by themselves, nor their acetates, possess the property of being phosphorescent by heat. Journ. de Pharmacie, Sept. 1821.

Phosphorescence of potatoes.—Lichtenberg tells us that an officer on guard at Strasburgh, in passing the barracks, was alarmed not long since on observing a light in one of the barrack-rooms. As this was strictly prohibited, fire was suspected, and he hurried forward to the apartment. On entering it he found the soldiers sitting up in bed admiring a beautiful light, which proceeded from potatoes in an incipient state of putrefaction. The light was so vivid that the soldiers could see to read by it; it gradually became less and less vivid, and entirely disappeared by the night of the 10th of the month.

On the phosphorescence of marine animals.— During a voyage to the Shetland and Orkney Islands, in 1821, Dr. M'Culloch had various opportunities of investigating the phenomena of marine luminous animals. In proceeding from the Mull of Cantyre to Shetland, and in almost all the harbours of Shetland and Orkney, he found the water filled with a species of animal which he considers to have been undescribed. A cubic inch of water did not contain fewer than 100 of these animals. In the same view, and nearly at all times, the water was found filled with several different species, resembling in size some of the infusoria. Other animals of larger dimensions, and of many species, were equally constant, and, if less numerous, yet ten or twenty were always to be found within the space of a common tumbler glass. In all these cases the water was luminous. The light of the whole of these species disappeared when they died, either from keeping the water too long, from warming it, or from the addition of spirits. Dr. M'Culloch has added upwards of 190 species to the list of luminous marine animals. The most conspicuous among these are about twenty small species of medusa, in addition to those already known to be luminous. In the ancient genus cancer a considerable number of squillæ were

also found possessed of phosphorescence. In the genera scolopendra and nereis five or six were luminous, which were all the species observed by Dr. M'Culloch. The other known genera in which luminous species were observed were phalangium, monoculus, oniscus, iulus, vorticella, cercaria, vibrio, volvox. To these Dr. M'Culloch adds, among the fishes, a new species of leptocephalus. The remaining luminous animals consisted of new genera, or at least of animals which could not be referred to any as yet to be found in authors. Dr. M'Culloch seems to think that the ling and other fish which inhabit the submarine valleys, at depths to which the light of day cannot penetrate, must perceive their food, and pursue their avocations, by the phosphorescence of their prey, or of the animals which abound in the sea, or by phosphorescence elicited from their own bodies. Dr. M'Culloch's observations were generally made in harbours, but never at a distance exceeding eight or ten miles from land. See the Journal of Science, Literature, &c., vol. xi. p. 248.

On the phosphorescence of the lampiris noctiluca and splendidula. In a curious paper on the phosphorescence of the lampyris noctiluca and splendidula, published in the Bibliotheque Universelle for May 1821, p. 52, M. Macaire has drawn the following conclusions from numerous observations: 1. A certain degree of heat is necessary to the voluntary phosphorescence of these animals. 2. Their phosphorescence is excited by a degree of heat superior to the first, and is irrecoverably destroyed by a higher temperature. 3. All bodies capable of coagulating albumen take away from phosphorising matter its power of phosphorescence. 4. The phosphorescence cannot take place but in a gas which contains oxygen. 5. It is excited by the galvanic pile, but no effect is produced upon it by electricity. 6. The phosphorescent matter is composed principally of albumen. But see our article LIGHT.

PHOSPHORIC ACID. Bones of beef, mutton, or veal, being calcined to whiteness in an open fire, lose almost half of their weight. These must be pounded, and sifted; or the trouble may be spared by buying the powder that is sold to make cupels for the assayers, and is, in fact, the powder of burned bones ready sifted. To three pounds of the powder there may be added about two pounds of concentrated sulphuric acid. Four or five pounds of water must be also added to assist the action of the acid. The whole may be then left on a gentle sand heat for two or three days, taking care to supply the loss of water which happens by evaporation. A large quantity of water must then be added, the whole strained through a sieve, and the residual matter, which is sulphate of lime, must be edulcorated by repeated affusions of hot water, till it passes tasteless. The waters contain phosphoric acid with a little lime; and by evaporation, first in glazed earthen, and then in glass vessels, or rather in vessels of platina or silver (for the hot acid acts upon glass) afford the impure acid in a concentrated state, which, by the force of a strong heat in a crucible, may be made to acquire the form of a transparent consistent glass, though, indeed, it is usually of a milky opaque appearance. For making phosphorus, it is not necessary to evaporate the water further than to bring it to the consistence of a syrup; and the small portion of lime it contains is not an impediment worth the trouble of removing, as it affects the produce very little. But, when the acid is required in a purer state, it is proper to add a quantity of carbonate of ammonia, which, by double elective attraction, precipitates the lime that was held in solution by the phosphoric acid. The fluid, being then evaporated, affords a crystallised ammoniacal salt, which may be melted in a silver vessel, as the acid acts upon glass or earthen vessels. The ammonia is driven off by the heat, and the acid acquires the form of a compact glass as transparent as rock-crystal, acid to the taste, soluble in water, and deliquescent in the air. This acid is commonly pure, but nevertheless may contain a small quantity of soda, originally existing in the bones, and not capable of being taken away by this process, ingenious as it is. The only unequivocal method of obtaining a pure acid appears to consist in first converting it into phosphorus by distillation of the materials with charcoal, and then converting this again into acid by rapid combustion, at a high temperature, either in oxygen or atmospheric air, or some other equivalent process.

Phosphorus may also be converted into the acid state by treating it with nitric acid. In this operation, a tubulated retort, with a ground stopper, must be half filled with nitric acid, and a gentle heat applied. A small piece of phosphorus, being then introduced through the tube, will be dissolved with effervescence, produced by the escape of a large quantity of nitric oxide. The addition of phosphorus must be continued until the last piece remains undissolved. The fire being then raised, to drive over the remainder of the nitric acid, the phosphoric acid will be found in the retort, partly in the concrete and partly in the liquid form. When phosphorus is burned by a strong heat, sufficient to cause it to flame rapidly, it is almost perfectly converted into dry acid, some of which is thrown up by the force of the combustion, and the rest remains upon the supporter.

This substance has also been acidified by the direct application of oxygen gas passed through hot water, in which the phosphorus was liquefied or fused.

The general characters of phosphoric acid are:—1. It is soluble in water in all proportions, producing a specific gravity which increases as the quantity of acid is greater, but does not exceed 2·687, which is that of the glacial acid. 2. It produces heat when mixed with water, though not very considerable. 3. It has no smell when pure, and its taste is sour but not corrosive. 4. When perfectly dry, it sublimes in close vessels: but loses this property by the addition of water; in which circumstance it greatly differs from the boracic acid, which is fixed when dry, but rises by the help of water. 5. When considerably diluted with water, and evaporated, the aqueous vapor carries up a small portion of the acid. 6. With charcoal or inflammable matter, in a strong heat, it loses its oxygen, and becomes converted into phosphorus.

Phosphoric acid is difficult of crystallising.

Though the phosphoric acid is scarcely corrosive, yet, when concentrated, it acts upon oils, which it discolors and at length blackens, producing heat, and a strong smell like that of ether and oil of turpentine; but does not form a true acid soap. It has most effect on essential oils, less on drying oils, and least of all on fat oils. From the syntheses of the phosphates of soda, barytes, and lead, Berzelius deduces the prime equivalent of phosphoric acid to be 4·5. But the experiments of Berzelius on the synthesis of the acid itself show it to be a compound of about 100 phosphorus + 133 oxygen. Lavoisier's synthesis gave 2 oxygen + 1·33 phosphorus. So did that of Sir. H. Davy by rapid combustion in oxygen gas, as published in the Philosophical Transactions for 1812. M. Dulong in an elaborate paper published in the third volume of the Memoires D'Arceuil, gives, as the result of diversified experiments, nearly the proportions of 100 phosphorus to 123 oxygen; or of 5 oxygen + 4 phosphorus = 9 for the acid equivalent.

Sir H. Davy, with his well known sagacity, invented a new method of research, to elude the former sources of error. He burned the vapor of phosphorus as it issues from a small tube, contained in a retort filled with oxygen gas. By adopting this process, he determined the composition of phosphoric acid to be 100 phosphorus + 134·5 oxygen; whence its equivalent comes out 3·500. Phosphorous acid he then shows to consist of 1 oxygen + 1·500 phosphorus = 2·500.

M. Dumas in an elaborate memoir on Phosphureted Hydrogen (Ann. de Chim. et de Phys. xxxi.) endeavours to show that phosphoric acid consists of 1 atom of phosphorus, 4·0 + 5 atoms of oxygen, 5 = 9; while phosphorous acid consists of 1 atom of phosphorus 4 + 3 atoms of oxygen, 3 = 7. See PHOSPHURETED HYDROGEN.

By the above atomic weights 1·5 phosphorus combines with 1·125 oxygen (instead of 1) to constitute phosphorous acid; and with 1·875 oxygen to constitute phosphoric acid. If phosphoric acid be made 9, then in the phosphates of soda, barytes, and lead, we must admit 2 atoms of base; thus giving them the characters of subsalts, which that of soda manifestly possesses.

PHOSPHORITE, in mineralogy, a subspecies of apatite. Common phosphorite is of a yellowish-white color, when rubbed in an iron mortar, or thrown on red hot coals. It emits a green-colored phosphoric light. It is found in Estremadura in Spain. Earthy phosphorite is of a grayish-white color, and consists of dull dusty particles, which phosphoresce on glowing coals. It is found in Hungary.

PHOSPHORUS, Gr. φως, light, and φερω, to carry. An assumed simple substance which has never been found pure in nature. It is always met with united to oxygen, and in this state very plentiful. If phosphoric acid be mixed with one-fifth of its weight of powdered charcoal, and the mixture distilled at a moderate red heat, in a coated earthen retort, whose beak is partially immersed in a basin of water, drops of a waxy-looking substance will pass over, and, falling into the water, will concrete into the solid called phosphorus.

M. Javal finds that the subphosphate of lime, obtained by digesting five parts of calcined bone powder with two parts of sulphuric acid, is better adapted to yield phosphorus by ignition with charcoal in a retort than pure phosphoric acid. The latter sublimes in a great measure undecomposed. Ann. de Chim. et de Physique, June, 1820.

It must be purified by straining it through a piece of chamois leather, under warm water. It is yellow and semi-transparent. It is as soft as wax, but fully more cohesive and ductile. Its specific gravity is 1·77. It melts at 90° Fahrenheit, and boils at 550°. In the atmosphere, at common temperatures, it emits a white smoke, which, in the dark, appears luminous. This smoke is acidulous, and results from the slow oxygenation of the phosphorus. In air perfectly dry, however, phosphorus does not smoke, because the acid which is formed is solid, and, closely incasing the combustible, screens it from the atmospherical oxygen.

When phosphorus is heated in the air to about 148° it takes fire, and burns with a splendid white light, and a copious dense smoke. If the combustion take place within a large glass receiver, the smoke becomes condensed into snowy looking particles, which fall in a successive shower, coating the bottom plate with a spongy white efflorescence of phosphoric acid. This acid snow soon liquefies by the absorption of aqueous vapor from the air. When it is inflamed in oxygen the light and heat are incomparably more intense; the former dazzling the eye, and the latter cracking the glass vessel. Solid phosphoric acid results; consisting of 4 phosphorus + 5·0 oxygen, or 1 atom of phosphorus + 5 of oxygen.

Phosphorus, heated in highly rarefied air, forms three products: one is phosphoric acid; one a volatile white powder; and the third a red solid of comparative fixity, requiring a heat above that of boiling water for its fusion. The volatile substance is soluble in water, imparting acid properties to it. It seems to be phosphorous acid. The red substance is probably an oxide of phosphorus, since for its conversion into phosphoric acid it requires less oxygen than phosphorus does. See PHOSPHORIC, PHOSPHOROUS, and HYDROPHOSPHOROUS ACIDS.

Phosphorous acid is composed of 1 atom phosphorus + 3 oxygen = 4 + 3 = 7.

Phosphorus and chlorine combine with great facility, when brought in contact with each other at common temperatures. When chlorine is introduced into a retort exhausted of air, and containing phosphorus, the phosphorus takes fire, and burns with a pale flame, throwing off sparks; while a white substance rises and condenses on the sides of the vessel. If the chlorine be in considerable quantity, as much as twelve cubic inches to a grain of phosphorus, the latter will entirely disappear, and nothing but the white powder will be formed, into which about nine cubic inches of the chlorine will be condensed. No new gaseous matter is produced. The powder is a compound of phos-

phorus and chlorine, first described as a peculiar body by Sir H. Davy in 1810; and various analytical and synthetical experiments which he made with it prove that it consists of about 1 phosphorus, and 6·8 chlorine in weight. The equivalent ratio of 1 prime of the first + 6 of the second constituent, gives 4 to 27, or 1 to 6·75. It is the bichloride of phosphorus. This case shows the necessity in chemistry of abiding by experiment; for Sir H. Davy's untrimmed result, which had been called in question or lightly esteemed by the ultra-atomists, who pitched on 1·5 for the prime equivalent of phosphorus, is now seen to accord perfectly with the corrected prime equivalent of Dumas.

Its properties are very peculiar. It is snow-white, extremely volatile, rising in a gaseous form at a temperature much below that of boiling water. Under pneumatic pressure it may be fused, and then it crystallises in transparent prisms. It acts violently on water, decomposing it, whence result phosphoric and muriatic acids; the former from the combination of the phosphorus with the oxygen, and the latter from that of the chlorine with the hydrogen of the water. It produces flame when exposed to a lighted taper. If it be transmitted through an ignited glass tube along with oxygen, it is decomposed, and phosphoric acid and chlorine are obtained. The superior fixity of the acid above the chloride seems to give that ascendancy of attraction to the oxygen here, which the chlorine possesses in most other cases. Dry litmus paper exposed to its vapor in a vessel exhausted of air is reddened. When introduced into a vessel containing ammonia, a combination takes place, accompanied with much heat, and there results a compound, insoluble in water, undecomposable by acid or alkaline solutions, and possessing characters analogous to earths.

The protochloride of phosphorus was first obtained in a pure state by Sir H. Davy, in the year 1809. If phosphorus be sublimed through corrosive sublimate, in powder in a glass tube, a limpid fluid comes over as clear as water, and having a specific gravity of 1·45. It emits acid fumes when exposed to the air, by decomposing the aqueous vapor. If paper imbued with it be exposed to the air, it becomes acid without inflammation. It does not redden dry litmus paper plunged into it. Its vapor burns in the flame of a candle. When mixed with water, and heated, muriatic acid flies off, and phosphorous acid remains. See Phosphorous Acid. If it be introduced into a vessel containing chlorine, it is converted into the bichloride; and, if made to act upon ammonia, phosphorus is produced, and the same earthy-like compound results as that formed by the bichloride and ammonia.

When phosphorus is gently heated in the protochloride, a part of it dissolves, and the fluid, on exposure to air, gives off acid fumes, from its action on atmospheric moisture, while a thin film of phosphorus is left behind, which usually inflames by the heat generated from the decomposition of the vapor. The first compound of this kind was obtained by M. M. Gay Lussac and Thenard, by distilling phosphorus and calomel together, in 1808; and they imagined it to be a peculiar combination of phosphorus, oxygen, and muriatic acid. No experiments have yet ascertained the quantity of phosphorus which the protochloride will dissolve. Probably, says Sir H. Davy, a definite combination may be obtained, in which the proportion of chlorine will correspond to the proportion of oxygen in the oxide of phosphorus.

The compounds of iodine and phosphorus have been examined by Sir H. Davy and M. Gay Lussac. Phosphorus unites to iodine with the disengagement of heat, but no light. One part of phosphorus and eight of iodine form a compound of a red orange-brown color, fusible at about 212°, and volatile at a higher temperature. When brought in contact with water, phosphureted hydrogen gas is disengaged, flocks of phosphorus are precipitated, and the water, which is colorless, contains in solution phosphorous and hydriodic acids. One part of phosphorus and sixteen of iodine produce a crystalline matter of a grayish-black color, fusible at 84°. The hydriodic acid produced by bringing it in contact with water is colorless, and no phosphureted hydrogen gas is disengaged. One part of phosphorus and twenty-four of iodine produce a black substance partially fusible at 115°. Water dissolves it, producing a strong heat, and the solution has a very deep brown color, which is not removed by keeping it for some time in a gentle heat. With 1 phosphorus and 4 iodine, two compounds, very different from each other, are obtained. One of them has the same color as that formed of 1 phosphorus + 8 iodine, and seems to be the same with it. It melts at 217·5°, and, when dissolved in water, yields colorless hydriodic acid, phosphureted hydrogen, and phosphorus; which last precipitates in orange-yellow flocks. The other compound is a reddish-brown, does not melt at 212°, nor at a considerably higher temperature. Water has no sensible action on it. Potassa dissolves it with the disengagement of phosphureted hydrogen gas; and, when aqueous chlorine is poured into the solution, it shows only traces of iodine. When heated in the open air, it takes fire and burns like phosphorus, emitting white vapors, without any iodine. When these vapors were condensed in a glass jar by M. Gay Lussac he could perceive no iodine among them. This red substance is always obtained when the phosphorus is in the proportion of 1 to 4 of iodine. M. Gay Lussac is inclined to consider it as identical with the red matter which phosphorus so often furnishes, and which is at present considered as an oxide. In whatever proportions the iodide of phosphorus has been made, it exhales acid vapors, as soon as it is moistened, owing to the hydriodic acid formed by the decomposition of the water. Such is the account of the iodide of phosphorus given by M. Gay Lussac. The combining ratios are somewhat uncertain.

Phosphorous Acid was discovered in 1812 by Sir H. Davy. When phosphorus and corrosive sublimate act on each other, at an elevated temperature, a liquid called protochloride of phosphorus is formed. Water, added to this, re-

solves it into muriatic and phosphorous acids. A moderate heat suffices to expel the former, and the latter remains, associated with water. It has a very sour taste, reddens vegetable blues, and neutralises bases. When heated strongly, in open vessels, it inflames. Phosphureted hydrogen flies off, and phosphoric acid remains. Ten parts of it heated in close vessels give off one-half of a phosphureted hydrogen, and leave 8½ of phosphoric acid. Hence the liquid acid consists of 80·7 acid + 19·3 water. Its prime equivalent is either 2·5 or 7. See PHOSPHURETED HYDROGEN.

A hypophosphorous acid was lately discovered by Dulong. Pour water on the phosphuret of barytes, and wait till all the phosphureted hydrogen be disengaged. Add cautiously to the filtered liquid dilute sulphuric acid, till the barytes be all precipitated in the state of sulphate. The supernatant liquid is hypophosphorous acid, which should be passed through a filter. This liquid may be concentrated by evaporation, till it become viscid. It has a very sour taste, reddens vegetable blues, aud does not crystallise. It is probably composed of 2 primes of phosphorus = 3 + 1 of oxygen. Dulong's analysis approaches to this proportion. He assigns, but from rather precarious data, 100 phosphorus to 37·44 oxygen. The hypophosphites have the remarkable property of being all soluble in water; while many of the phosphates and phosphites are insoluble.

Thenard succeeded in oxygenising phosphoric acid by the method described under NITRIC and MURIATIC ACIDS in CHEMTSTRY.

With regard to the phosphates and phosphites, we have many discrepancies in our latest publications. Sir H. Davy says, in his last memoir on some of the combinations of phosphorus, that new researches are required to explain the anomalies presented by the phosphates.

Phosphoric acid, united with barytes, produces an insoluble salt, in the form of a heavy white powder, fusible at a high temperature into a gray enamel. The best mode of preparing it is by adding an alkaline phosphate to the nitrate or muriate of barytes.

By mixing phosphate of ammonia with nitrate of barytes, Berzelius found that 68·2 parts of barytes, and 31·8 of phosphorus, composed 100 of the phosphate. Hence it is a subphosphate, and consists of,

Phosphoric acid	1 atom	=	9·0	68·42
Barytes	2	=	19·5	31·58
				100·0

He made a phosphate by dissolving the above in dilute phosphoric acid, and evaporating, when crystals were obtained composed, in 100 parts, of acid, 42·54; barytes 46·46; water 11. But by theory we have,

Acid	2 atoms	18	42·857	100·000
Base	2	19·5	46·430	
Water	4	4·5	10·713	

By pouring a solution of the preceding salt into alcohol, a sesquiphosphate is obtained, in the form of a light white powder, containing 1½ times as much acid as the subphosphate.

The phosphate of strontian differs from the preceding in being soluble in an excess of its acid.

Phosphate of lime is very abundant in the native state. See APATITE. It likewise constitutes the chief part of the bones of all animals.

Phosphate of lime is very difficult to fuse, but in a glass-house furnace it softens, and acquires the semitransparency and grain of porcelain. It is insoluble in water; but, when well calcined, forms a kind of paste with it, as in making cupels. Besides this use of it, it is employed for polishing gems and metals, for absorbing grease from cloth, linen, or paper, and for preparing pnosphorus. In medicine it has been strongly recommended against the rickets by Dr. Bonhomme of Avignon, either alone or combined with phosphate of soda. The burnt hartshorn of the shops is a phosphate of lime.

An acidulous phosphate of lime is found in human urine, and may be crystallised in small silky filaments, or shining scales, which unite together into something like the consistence of honey, and have a perceptibly acid taste. It may be prepared by partially decomposing the calcareous phosphate of bones by the sulphuric, nitric, or muriatic acid, or by dissolving that phosphate in phosphoric acid. It is soluble in water, and crystallisable. Exposed to the action of heat, it softens, liquefies, swells up, becomes dry, and may be fused into a transparent glass, which is insipid, insoluble, and unalterable in the air. In these characters it differs from the glacial acid of phosphorus. It is partly decomposable by charcoal, so as to afford phosphorus.

By pouring phosphate of soda into muriate of lime, Berzelius obtained a phosphate of lime consisting of acid 100, lime 84·53. The exact proportions are,

Phosphuric acid = 9 = 100
Lime 3·5 × 2 = 7 = 78 nearly.

The phosphate of potassa is very deliquescent, and not crystallisable, but condensing into a kind of jelly. Like the preceding species, it first undergoes the aqueous fusion, swells, dries, and may be fused into a glass; but this glass deliquesces. It has a sweetish saline taste. The phosphate of soda is now commonly prepared by adding to the acidulous phosphate of lime as much carbonate of soda in solution as will fully saturate the acid. The carbonate of lime which precipitates, being separated by filtration, the liquid is duly evaporated so as to crystallise the phosphate of soda; but, if there be not a slight excess of alkali, the crystals will not be large and regular. The crystals are rhomboidal prisms of different shapes; efflorescent; soluble in three parts of cold and one and a half of hot water. They are capable of being fused into an opaque white glass, which may be again dissolved and crystallised. It may be converted in an acidulous phosphate by an addition of acid, or by either of the strong acids, which partially, but not wholly, decompose it. As its taste is simply saline, without any thing disagreeable, it is much used as a purgative, chiefly in broth, in which it is not distinguishable from common salt. For this elegant addition to our pharmaceutical pre-

parations we are indebted to Dr. Pearson. In assays with the blow-pipe it is of great utility; and it has been used instead of borax for soldering.

In crystals, this salt is composed, according to Berzelius, of phosphoric acid 20·33, soda 17·67, water 62·00: and, in the dry state, of acid 53·48, soda 46·52. If it be represented by 1 atom of acid = 9 + 2 atoms soda = 8, then 100 of the dry salt will consist of acid 53, base 47; and, in the crystallised state, of

Water	24 atoms	27	61·4
Acid	1	9	20·4
Soda	2	8	18·2
			100·0

which presents a good accordance with the experimental results of the accurate Berzelius.

The phosphate of ammonia crystallises in prisms with four regular sides, terminating in pyramids, and sometimes in bundles of small needles. Its taste is cool, saline, pungent, and urinous. On the fire it comports itself like the preceding species, except that the whole of its base may be driven off by a continuance of the heat, leaving only the acid behind. It is but little more soluble in hot water than in cold, which takes up a fourth of its weight. It is pretty abundant in human urine. It is an excellent flux both for assays and the blow-pipe, and in the fabrication of colored glass and artificial gems.

Phosphate of magnesia crystallises in irregular hexahedral prisms, obliquely truncated; but is commonly pulverulent, as it effloresces very quickly. It requires fifty parts of water to dissolve it. Its taste is cool and sweetish. This salt too is found in urine. Fourcroy and Vauquelin have discovered it likewise in small quantity in the bones of various animals, though not in those of man. The best way of preparing it is by mixing equal parts of the solutions of phosphate of soda and sulphate of magnesia, and leaving them some time at rest, when the phosphate of magnesia will crystallise, and leave the sulphate of soda dissolved.

An ammoniaco-magnesian phosphate has been discovered in an intestinal calculus of a horse by Fourcroy, and since by Bartholdi, and likewise by the former in some human urinary calculi. See Calculus. Notwithstanding the solubility of the phosphate of ammonia, this triple salt is far less soluble than the phosphate of magnesia. It is partially decomposable into phosphorus by charcoal, in consequence of its ammonia.

The phosphate of glucine has been examined by Vauquelin, who informs us that it is a white powder, or mucilaginous mass, without any perceptible taste; fusible, but not decomposable by heat; unalterable in the air, and insoluble unless in an excess of its acid.

It has been observed that the phosphoric acid, aided by heat, acts upon silex; and we may add, that it enters into many artificial gems in the state of a siliceous phosphate. See Salt.

Phosphorus (of Baldwin), a name for ignited muriate of lime.

Phosphorus (of Canton). Oyster shells calcined with sulphur.

Phosphorus (of Bologna). See Light. Sulphate of barytes.

PHOSPHURET. A compound of phosphorus with a combustible or metallic oxide.

Phosphureted Hydrogen. Of this compound there are two varieties; one of which may be called perphosphureted hydrogen; another protophosphureted hydrogen.

1. *Perphosphureted hydrogen.* Into a small retort filled with milk of lime, or potassa water, let some fragments of phosphorus be introduced, and let the heat of an Argand flame be applied to the bottom of the retort, while its beak is immersed in the water of a pneumatic trough. Bubbles of gas will come over, which explode spontaneously with contact of air. It may also be procured by the action of dilute muriatic acid on phosphuret of lime. In order to obtain the gas pure, however, we must receive it over mercury. Its smell is very disagreeable. Its specific gravity is 0·9022. 100 cubic inches weigh 27·5 grains. In oxygen it inflames with a brilliant white light. In common air, when the gaseous bubble bursts the film of water and explodes, there rises up a ring of white smoke, luminous in the dark. Water absorbs about one-fortieth of its bulk of this gas, and acquires a yellow color, a bitter taste, and the characteristic smell of the gas. When brought in contact with chlorine it detonates with a brilliant green light; but the products have never been particularly examined. By transmitting a series of electric explosions through phosphureted hydrogen, the phosphorus is precipitated, and hydrogen of the original gaseous volume remains. Hence the composition of the gas may be deduced from a comparison of its specific gravity with that of hydrogen.

Phosphureted hydrogen	0·9022
Hydrogen	0·0694
Phos. = difference of weight,	0·8328

Thus we perceive that this compound consists of 0·8328 phosphorus + 0·0694 hydrogen; or 12 + 1; or 1·5 + 0·125 = 1·625, which is the weight of the sum of the primes, commonly called the weight of its atom. The gas may be likewise conveniently analysed by nitrous gas, nitrous oxide, or oxygen. The preceding densities and proportions are those currently given by British writers, and are probably incorrect. See these numbers corrected by M. Dumas further on, and also in the general Table of Gases.

2. *Protophosphureted hydrogen.* It was discovered by Sir H. Davy in 1812. When the crystalline hydrate of phosphorous acid is heated in a retort out of the contact of air, solid phosphoric acid is formed, and a large quantity of subphosphureted hydrogen is evolved. Its smell is fetid, but not so disagreeably so as that of the preceding gas. It does not spontaneously explode like it with oxygen; but at a temperature of 300° a violent detonation takes place. In chlorine it explodes with a white flame. Water absorbs one-eighth of its volume of this gas. When potassium is heated in it its volume is doubled, and the resulting gas is pure hydrogen. When sulphur is sublimed in one volume of it

a sulphuret of phosphorus is formed, and nearly two volumes of sulphureted hydrogen are produced.

Such is the constitution of these two compounds of phosphorus and hydrogen as taught by our systematists, and confirmed to apparent demonstration by Dr. Thomson in his First Principles of Chemistry, I. 203. But it is to be feared that the atomic theory, misapplied, has here acted as a false light merely to mislead from the straight path of experiment. For M. Dumas in an able memoir has adduced very decisive evidence of the inaccuracy of the above views, and has been led to conclude that protophosphureted and perphosphureted hydrogen contain each the same bulk of hydrogen, that is, 1½ time their own volume; that the quantities of phosphorus with which that hydrogen is combined in the two gases are not in the ratio of 1 to 2, but of 2 to 3; that the ratio of 3 to 5 instead of 1 to 2, holds with regard to the oxygen in phosphorous and phosphoric acids, agreeably to the well known determination of Berzelius; and finally that the gases obtained by heating phosphorous acid, or by leaving perphosphureted hydrogen over water or mercury for a few days, are not different in their nature, but truly identical. We therefore present the results of M. Dumas in a supplementary form, whence they may be compared with those latterly adopted in this country.

1. *Protophosphureted hydrogen.* This gas may be obtained perfectly pure by heating the phosphatic, phosphorous, or hypophosphorous acids, or by admitting fragments of phosphuret of lime or barytes to concentrated muriatic acid. But the gas disengaged from phosphuret of lime by water alone, or by muriatic acid diluted with ten times its weight of water, consists in the former case of perphosphureted hydrogen 87 + hydrogen 13; and in the latter of perphosphureted hydrogen 97 + water 7. Protophosphureted hydrogen is not spontaneously combustible in air, as the other gas is. 100 measures of protophosphureted hydrogen, heated with bichloride of mercury, afford 300 measures of muriatic acid gas, which contain 150 of hydrogen. But, when 100 measures of that phosphureted gas are heated in contact with sulphur, only 135 measures of sulphureted hydrogen are obtained instead of 150; because 100 of sulphureted hydrogen become ninety by being heated with sulphur; and 90 : 100 :: 135 : 150. From inattention to this important fact, several analytical errors have arisen. The detonation of protophosphureted hydrogen mixed with oxygen is elegantly effected by a slight difference of pressure: by raising for instance the eudiometer tube a few inches above the level of the mercury. If this circumstance be not adverted to, unexpected explosions may occur.

One volume of protophosphureted hydrogen gas absorbs in explosion two volumes of oxygen; and, as the volume and a half of hydrogen which it contains requires three-fourths of a volume of oxygen, the remaining five-fourths of a volume of oxygen must go to the phosphorus. One volume of this phosphureted gas may also combine with a volume and a half of oxygen, in which case phosphorous acid is formed with the three-fourths of oxygen; whereas phosphoric acid was the former product with the five-fourths of oxygen. Thus it would appear that the quantities of oxygen in phosphorous and phosphoric acids are to each other in the proportion of 3 to 5. The perphosphureted hydrogen procured by the action of phosphorus on milk of lime is spontaneously transformed by keeping over water to the protophosphureted gas, without experiencing any alteration in its volume, simply by depositing phosphorus. The proportion of pure hydrogen which is always present in the perphosphureted gas, and which of course remains mixed with the protophosphureted, is easily ascertained by solution of sulphate of copper, which speedily absorbs the phosphureted gas. Protophosphureted gas thus prepared and examined was weighed with all the requisite precautions, and found to have a specific gravity of 1·214, air being 1000. Deducting from 1·214, 0·104 ($= \frac{0·0694 + 0·0694}{2}$), being a volume and a half of hydrogen, the remainder 1·110 is the weight of phosphorus combined in this gas with the 0·104 of hydro[illegible] Now this is nearly the ratio of 10 to 1; wh[illegible] if we were to consider it a compound of [illegible] atom of each constituent, the prime equivalent of phosphorus would come out 10·78 on the hydrogen scale, or 1·4 on the oxygen. M. Dumas, who adopts, with Berzelius, 0·0623 as the atom of hydrogen and the radix of atomic weights, supposes that in the protophosphureted gas six atoms of hydrogen are combined with one of phosphorus, and infers the equivalent of phosphorus to be 402·3: for,

$$0·103 : 1·111 :: 37·4 (= 6\ \text{H}) : 402·3.$$

The number of Berzelius is 392·3; therefore M. Dumas proposes to assume 400, the same as M. Dulong fixed on from the analyses of perchloride of phosphorus and phosphuret of copper.

2. *Perphosphureted hydrogen.* This gas, obtained by acting on phosphorus in a retort, with a boiling-hot solution of caustic potassa, consists very uniformly of thirty-seven and a half of perphosphureted gas mixed with sixty-two and a half of pure hydrogen; or of three of the former to five of the latter. The phosphureted gas is easily abstracted by a solution of sulphate or nitrate of copper, or of corrosive sublimate. Phosphuret of barytes disengages from distilled water a mixed gas, consisting of forty-three of pure hydrogen, and fifty-seven of the perphosphureted gas. Phosphuret of lime, acted on by a little water over mercury, affords a similar mixture of gases, of which eighty-seven are perphosphureted, and thirteen pure hydrogen. The same substance, acted on by strong muriatic acid, affords protophosphureted hydrogen with deposition of phosphorus. The perphosphureted hydrogen obtained by boiling milk of lime on phosphorus is most variable in its proportion of intermingled hydrogen; this near the beginning of the process about [illegible] per cent., and towards the end so high as [illegible] six. Yet all these gases are equally infla[illegible] ble in the air.

Corrosive sublimate acts on the above mixed gases as it does on protophosphureted hydrogen, and the hydrogen gas intermingled remains pure, without combining with the chlorine, at least at the heat of the alcohol flame. The action of the corrosive sublimate becomes energetic whenever it melts. The gas enlarges much in volume, and an orange-brown matter is produced. Seventy-six parts of the mixed gas, containing forty-seven and a half of pure hydrogen and twenty-eight and a half of perphosphureted gas, afforded eighty-six of muriatic acid gas, containing forty-three of hydrogen; whence perphosphureted hydrogen evidently contains a volume and a half of pure hydrogen condensed into one volume, just like the protophosphureted gas. The gas from phosphuret of lime and water, which is the purest that can be obtained, afforded also, by a similar treatment, three volumes of muriatic acid gas for every volume of the pure perphosphureted hydrogen, indicating one volume and a half of pure hydrogen condensed in that single volume. The mixed gas from phosphuret of lime and water contains from eleven to twelve per cent. of uncombined hydrogen. Such mixed gas, heated by a spirit flame, in contact with fine iron or copper wire in a glass vessel, affords out of every volume of the perphosphureted gas one volume and a half of pure hydrogen.

In order to effect the analysis of the perphosphureted gas by oxygen, M. Dumas prepared absolutely pure carbonic acid. Some of it he mixed with its own volume of pure oxygen; and some with variable proportions of perphosphureted hydrogen obtained from potassa w ter and phosphorus. He then heated the mixture of carbonic acid gas and oxygen to 212° or 230° Fahrenheit, and introduced into it by bubble after bubble the mixture of carbonic acid and perphosphureted hydrogen. With these precautions the experiment proceeded quietly; each bubble exploded on entering, however minute it might be. The light was faint and yellowish, without the lustre and vivacity observed in the ordinary combustions of this kind. When the operation was completed, he absorbed the carbonic acid by moist fragments of caustic potassa used in excess, and measured carefully the residuum, ascertaining the purity of the residual oxygen by explosion with hydrogen in the eudiometer over mercury. From the mean of these experiments, it results that 151 measures of perphosphureted hydrogen, produced by the action of phosphorus on water of potassa, consume 152 measures of oxygen; which may be regarded as the ratio of volume to volume. But this ratio, so simple in appearance, becomes somewhat complex when we come to consign, to each of the bodies that the perphosphureted hydrogen contains, the portion of oxygen due to it. In fact,

8 measures of the above gas	= 5 hydrogen	+ 3 perphosphureted hydrogen	
8	oxygen = 2·5	+ 5·5.	

That is to say, three volumes of pure perphosphureted hydrogen consume 5·5 volumes of oxygen; or eight volumes consume 14·6 of oxygen; but

8 perphosphureted hydrogen pure	= 12 hydrogen	+ x phosphorus
14·6 oxygen	= 6	+ 8·6 phosphorus.

It is therefore evident that, in the combustion of perphosphureted hydrogen made under the above specified conditions, the hydrogen takes two volumes of oxygen and the phosphorus three, to form water and phosphorous acid.

Perphosphureted hydrogen gas, left to itself for some days, loses a third of the phosphorus that it contains, passing to the state of protophosphureted hydrogen without any change of volume. When the perphosphureted hydrogen is decomposed by the protoxide of azote, eight volumes of the former consume twenty-one of the oxygen of the latter, six of which go to the twelve of hydrogen in the eight of the perphosphureted gas, and fifteen to the phosphorus. In this case phosphoric acid is formed. Hence the same quantity of phosphorus takes either nine or fifteen volumes of oxygen; which gives the relation of three to five, formerly noticed. The explosion of protoxide of azote and perphosphureted hydrogen is extremely violent, and ought on this account to be performed on small quantities.

The specific gravity of perphosphureted hydrogen, determined by M. Dumas with much care, was found to be . . . . . 1·761
from which if we deduct 1½ vol. of hydr. 0·104
we shall have the remainder . . = 1·657
for phosphorus. Here the proportion reduced to hydrogen as unity is sixteen to one. M. Dumas, supposing the hydrogen and the phosphorus to be combined in the ratio of four atoms of the former to two atoms of the latter, states the following proportion:—

0·103 : 1·658 :: 24·87 (= 4 H) : 400·33;

which would be the atomic weight of phosphorus on the scale of Berzelius, where oxygen = 100, and hydrogen = 6·2175, or nearly $\frac{12·5}{2}$.

In this ingenious and elaborate research of M. Dumas, nothing is more striking than the difference between his specific gravities of these two gases and the densities assigned to the same gases in Dr. Thomson's First Principles, where every number, by a process of logical legerdemain, is made to tally with his atomic notions to the third or fourth place of decimals. Thus his gas (perphosphureted hydrogen) from phosphuret of lime and water has a specific gravity of 0.90277; and is thus made up:—

Hydrogen,	1 volume	0.06944 or	1 atom	0·125
Phosphorus,	1 do.	0·83333	1	1·5 !
		0·90277		

Bihydroguret of phosphorus (protophosphureted hydrogen of Dumas).

Hydrogen, 2 vols. . . .	0·1388
Phosph. 1 do.	0·8333
	0·9721

Here this gas is made to contain two volumes of hydrogen, and have a density = 0·9722.

Phosphorus and sulphur are capable of combining. They may be united by melting them together in a tube exhausted of air, or under water. In this last case they must be used in small quantities; as, at the moment of their action, water is decomposed, sometimes with explosions. They unite in many proportions. The most fusible compound is that of one and a half of sulphur to two of phosphorus. This remains liquid at 40° Fahrenheit. When solid, its color is yellowish-white. It is more combustible than phosphorus, and distils undecompounded at a strong heat. Had it consisted of 2 sulphur + 4 phosphorus, we should have had a definite compound of 1 prime of the first + 1 of the second constituent. This proportion forms the best composition for phosphoric fire-matches or bottles. A particle of it attached to a brimstone match inflames when gently rubbed against a surface of cork or wood. An oxide made by heating phosphorus in a narrow-mouthed phial with an ignited wire answers the same purpose. The phial must be kept closely corked, otherwise phosphorous acid is speedily formed.

Phosphorus is soluble in oils, and communicates to them the property of appearing luminous in the dark. Alcohol and ether also dissolve it, but more sparingly.

When swallowed in the quantity of a grain it acts as a poison. Azote dissolves a little of it, and has its volume enlarged by about one-fortieth.

PHOTINIANS, in ecclesiastical history, a sect of heretics in the fourth century, who denied the divinity of our Lord. They derive their name from

PHOTINUS, their founder, who was bishop of Sirmium, and a disciple of Marcellus. Photinus published, in the year 343, his notions respecting the Deity, which were repugnant both to the orthodox and Arian systems. He asserted that Jesus Christ was born of the Holy Ghost and the Virgin Mary; that a certain divine emanation, which he called the Word, descended upon him; and that because of the union of the divine word with his human nature he was called the Son of God, and even God himself: that the Holy Ghost was not a person, but merely a celestial virtue proceeding from the Deity. Both parties condemned the bishop in the councils of Antioch and Milan, held in the years 345 and 347. He was condemned also by the council at Sirmium in 351, and was afterwards degraded from the episcopal dignity, and at last died in exile in the year 372 or 375. His opinions were afterwards revived by Socinus.

PHOTIUS, patriarch of Constantinople, was one of the finest geniuses of his time. He was born in Constantinople, and descended of a noble family. His merit raised him to the patriarchate; for, Bardas having driven Ignatius from the see, Photius was consecrated by Asbestus in 859. He condemned Ignatius in a synod, whereupon the pope excommunicated him, and he, to balance the account, anathematised the pope. Basilius of Macedon, the emperor whom Photius had reproved for the murder of Michael, expelled him, and restored Ignatius; but afterwards re-established Photius upon Ignatius's death, in 878. At last being wrongfully accused of a conspiracy against Leo the philosopher, son and successor to Basilius, he was expelled by him in 886, and died soon after. He wrote a Bibliotheca, which contains an examen of 280 authors; also 253 epistles; the Nomacanon under fourteen titles; an abridgment of the acts of several councils, &c. His natural abilities were very great. There was no branch of art or science in which he was not versed. He was first raised to the chief dignities of the empire, being made principal secretary of state, captain of the guards, and a senator; and in all these stations acquitted himself well. His rise to the patriarchate was very quick; for, being a layman, he was made monk the first day, reader the next, and the following day sub-deacon, deacon, and priest. So that in six days he attained to the highest office in the church. But his unbounded ambition made him commit excesses which rendered him a scourge to those about him. Fabricius calls his Bibliotheca, non liber, sed insignis thesaurus, 'not a book, but an illustrious treasure,' in which are contained many curious things no where else to be found. It was brought to light by Andrew Schotus, and communicated by him to David Hoeschelius, who caused it to be printed in 1601. Schottus translated it into Latin, and printed his translation alone in 1606. The Greek text and translation were printed at Geneva in 1611. The last and best edition was printed at Rouen in 1653, folio.

PHOTOCITE, a mixture of the silicate and carbo-silicate of manganese.

PHOTOMETER, an apparatus for measuring the intensity of light, and the transparency of the medium through which it passes. Instruments for this purpose have been invented by count Rumford, M. de Saussure, Mr. Leslie, and others. Mr. Leslie's is the simplest instrument of the kind, but it only measures the momentary intensities of light; and a description of all of them would take up too much room. We therefore refer the inquisitive reader to Nicholson's Philosophical Journal, vol. iii. De Saussure's photometer is also called a diaphanometer. Mr. Leslie's photometer may be considered as a differential thermometer, having one of its balls of colorless glass, the other of black glass. The light produces no effect upon the transparent ball, but it heats the black ball according to its intensity; and this heat, by depressing the liquid in the tube, marks the intensity of the light.

PHOTOPSIA (from φως, light, and οψις, vision), lucid vision. An affection of the eye in which the patient perceives luminous rays, ignited lines, or coruscations.

PHOXUS, a general of the Phocæans, who burnt Lampsacus.

PHRAGANDÆ, an ancient people of Thrace. Livy, xxvi. c. 25.

PHRAORTES, the son of Dejoces, and the second king of the Medes, succeeded his father about A. A. C. 657, and reigned twenty-two years. He was killed in a fruitless attempt on Nineveh, and was succeeded by his son Cyaxares I.

PHRASE, *n. s.* & *v. a.* } Gr. φρασις. Idiom;
PHRASEOL'OGY, *n. s.* } peculiar expression; mode of speech: to phrase is to term, style, call: phraseology, diction; style.

Thou speak'st
In better *phrase* and matter than thou didst.
Shakspeare.

These suns,
For so they *phrase* them, by their heralds challenged
The noble spirits to arms. *Id. Henry VIII.*

To fear the Lord, and depart from evil, are *phrases* which the Scripture useth to express the sum of religion. *Tillotson.*

Now mince the sin,
And mollify damnation with a *phrase*:
Say you consented not to Sancho's death,
But barely not forbad it. *Dryden.*

The scholars of Ireland seem not to have the least conception of a stile, but run on in a flat *phraseology*, often mingled with barbarous terms. *Swift.*

Precision is the third requisite of perspicuity with respect to words and *phrases*. *Murray.*

PHRASE is sometimes used for a short sentence or small set or circuit of words constructed together. In this sense father Buffier divides phrases into complete and incomplete. Phrases are complete where there is a noun and a verb, each in its proper function; i. e. where the noun expresses a subject, and the verb the thing affirmed of it. Incomplete phrases are those where the noun and the verb together only do the office of a noun; consisting of several words without affirming any thing, and which might be expressed in a single word. Thus, 'that which is true,' is an incomplete phrase, which might be expressed in one word, truth; as, 'that which is true satisfies the mind,' i. e. 'truth satisfies the mind.'

PHRASE, in music, means a complete sense composed of one or more musical propositions, terminated by a cadence more or less complete. In a phrase there may be various significations or ideas, viz. the principal, which commences and terminates the phrase, the expletives, incidents, oblique or subordinate. *To phrase* is to round, as in discourse, the different phrases of a musical period. Music, without phrases, called also hemistics, is sound without sense, whether in its composition or performance.

PHRASE, or PHRASED, a musical composition performed upon the principle of hemistics, or whose melodic phrases are rounded off.

PHRASEOLOGY is also used for a collection of the phrases or elegant expressions in any language.

PHREAS (John), M. D., an English physician, born at London in the end of the fourteenth century. He was educated at Oxford, and became fellow of Baliol College. He translated from the Greek into Latin Diodorus Siculus, and other ancient works. He read lectures on medicine at Ferrara, Florence, and Padua, at which last university he was presented with his degree. He died in 1465.

PHREATIS, or PHREATIUM, in Grecian antiquity, was a court belonging to the civil government of Athens, situated upon the sea-shore in the Piræus. The name is derived from απο τȣ φρεατος, because it stood in a pit; or, as others suppose, from the hero Phreatus. This court heard such causes as concerned persons who had fled out of their own country for murder, or those who fled for involuntary homicide, and who had afterwards committed a deliberate and wilful murder. The first who was tried in this place was Teucer, on a groundless suspicion that he had been accessory to the death of Ajax. The accused was not allowed to come to land, or so much as to cast anchor, but pleaded his cause in his bark; and if found guilty was committed to the mercy of the winds and waves, or, as some say, suffered more condign punishment; if innocent he was only cleared of the second fact, and, according to custom, underwent a twelvemonth's banishment for the former. See Potter's Gr. Antiquities, vol. i.

PHRENETIC is used of those who, without being absolutely mad, are subject to such strong sallies of imagination as in some measure pervert their judgment and cause them to act in a way different from the more rational part of mankind.

PHRENITIS is the same with phrenzy; an inflammation of the brain, attended with an acute fever and delirium. See MEDICINE.

PHRENOLOGY.

PHRENOLOGY (of Gr. φρην the mind, and λογος, a discourse), denotes strictly the science of mind, and has recently been applied to a new theory of philosophy, which teaches—

1. That the brain is a congeries of so many distinct parts, each of which is the organ of some innate special faculty.

2. That the power of manifesting each faculty is always proportionate to the size and activity of that organ or part of the brain with which it is supposed to be in immediate connexion.

3. That it is possible to ascertain, during life, the relative sizes of these organs by the corresponding protuberances or enlargements on the external surface of the cranium.

In our article BRAIN it is suggested that the term phrenology, in application to the hypothesis, the legitimacy of which is now to be discussed, 'seems too presumptive and too restrictive—too presumptive in implying or taking for granted that this is the true science of mind; and too restrictive, because the phrenic or mental part of the argument does not comprehend its whole scope and bearing; the system of Gall and Spurzheim (the principal founders and promulgators of it), constituting, when taken in its full stretch of latitude, in some sort a new system of neurology in general.' But Dr. Spurzheim, who we believe was the first to propose the present denomination, might have been guided in his choice by an anxiety which he and his original master, Gall, have ever manifested to scout the idea of their doctrines being, as some have supposed them to be, merely a new system of phy-

siognomy. 'Denude,' says Dr. S., 'the whole of the brain, and present it to me without any cranial covering, and I will pledge myself to as correct an opinion of its phrenological character, as had I to judge of the same brain, surrounded and encompassed by its membraneous and bony investments.' Craniology, therefore, is an improper appellation to give to our science; and cranioscopy is obviously as bad, since they both suppose a knowledge only of the exterior, while our investigations and our inferences have to do with what is within much more than what is merely on the surface, or manifest to every beholder. Our anatomy is new, our physiology is new, our metaphysics are new; or rather, in reference to the last, we should say, that metaphysics has hitherto been a science merely in name, since it has abandoned physicology, and taught to satisfy itself with mere abstractions.

Our present duty is that of historians and narrators. If in the course of the present article a bearing to one side of the argument be discovered, let the reader be told that some twelve or fourteen years since, when Dr. Spurzheim's book first made its appearance, the individual who principally supplies this article furnished a review of Dr. S.'s volume, which all would agree in pronouncing rather condemnatory than in support of the doctrine. See Eclectic Review, 1815. Whether he still preserve his originally hostile feeling to the cause, or whether he be completely indifferent respecting the subject, and pretended science, is for any reader to determine who may think it worth his while to bestow an hour's consideration on the topic. All that we think it right further to say in the way of preface is this, that impartiality shall at any rate be aimed at, and that failure shall not be legitimately chargeable upon design or intention. It may be proper to remind the reader too, that, although the plural pronoun is used in the construction of the paper, as is usual in all articles admitted into a miscellaneous collection, neither the editor, or other contributors, are responsible for the opinions of individual writers on subjects open to controversy.

We cannot perhaps give a more convincing proof of our impartial feeling than by freely extracting from able writers, who have taken different estimates of the validity of this doctrine. The first of them, an acute reasoner, is decidedly hostile to its claims.

'Neither in man nor in animals,' says Mr. Stone, 'is it possible to ascertain during life the relative positions and sizes of those organs to which each of the more favored faculties has been assigned 'a local habitation and a name.' Dr. Spurzheim has lately observed, 'We do not judge by the particular elevations and lumps upon the skull, but by its general development. Our adversaries are the bumpists—but no, look at the general appearance—judge for yourselves (MS. notes of lectures on the anatomy, physiology, and pathology of the brain, delivered in Edinburgh, 1828). 'What,' continues Mr. Stone, 'Dr. Spurzheim would have us to understand by this declaration, it is impossible to comprehend; for in the same course, nay, in the same lecture, he proceeded to demonstrate the individual bumps and protuberances which in fact constitute the system. Have not the phrenologists like the aspiring giants of the olden time, who piled Mount Ossa on Pelion, and Pelion on Olympus, crowded organ upon organ from the base to the vertex of the head? Have not the supposed relative positions and dimensions of these, as indicated by isolated protuberances, been taught in books, lectures, and delineated on all the phrenological busts? Have they not pretended to measure them severally and individually in living characters even to the eighth of an inch? But this is not all. In adverting to the custom which different nations have of compressing and otherwise changing the form of the head, Dr. Spurzheim remarked—'The instrument that is worn for this purpose has been brought to England; I know not exactly how long it has been used, but have heard about two years. It is curious and worthy investigation, and I would have you, should any of you have the opportunity, make this enquiry, see, when the bone is compressed, whether the brain underneath it ceases to increase in size. You may try it in animals; for, if it be the case, then we could in infants compress the head in its different parts, *so as to give* a direction and development to the best and noblest facts of the human mind.'—MS. notes of lectures, delivered in Edinburgh in 1828.

'How beautiful,' says Mr. S., 'is this suggestion! How characteristic of the philosophy of all the phrenological speculations! When this annus mirabilis comes to pass it will be the millennium of phrenology. We shall then, indeed, hear no more of 'little lumps and protuberances,' but shall speak of the mountain of veneration being bounded on the south by the valley of amativeness, and on the east and west by the caverns of destructiveness. The ideal republic of Plato, the Atalantis of Harrison, the Utopia of More, were all only dim and faint conceptions of that state of perfectibility of which the human mind and heart are thus supposed susceptible.'

In another part of the pamphlet from which we have borrowed this spirited extract we find a most eloquent appeal against the phrenological tenets grounded on the assumption that national circumstances, the force of example, and the varieties of creeds, have much more to do with the excitement and manifestation of passion than have the physical construction, whether of the head or any other part of the frame. We regret that we can only extract a part of this passage.

'The organ of destructiveness, originally termed that of murder, is considered by the phrenologists as having been completely established; yet the manifestation of the feelings attributed to this faculty will invariably be found to result from those external circumstances and moral causes which alone appear to determine all the darker, as well as the brighter, traits of human character.'—

'The duty of vengeance is held to be imperative among the North American Indians. The instance is related by a traveller of a young Choctaw, who, having been reproved by his mother, 'took it so ill as, in the fury of his shame, to resolve on his own death.' He committed suicide, and his sister, being his nearest relation and thinking herself bound to revenge his loss, told

her mother she had caused her brother's death, and must pay for his life. 'Whereupon the old woman resigned herself to her fate, and died by the hands of her daughter.'—Roman's Natural History of Florida. Among the Japanese the spirit of vengeance is carried so far that even the females, as well as the men, carry a dagger in their girdle, and employ it with the utmost coolness in their personal quarrels, not only against enemies and strangers, but even against their own brothers, husbands, and nearest relatives.—Taverner's Relation of Japan; Homberg's Voyages in Japan. Among the Karatschai, or black Circassians, a similar principle prevails. When one man has been killed by another, the relatives of the deceased consider it necessary to avenge his death by the blood of the murderer, which they conceive can alone give rest to his and their souls.—Klaproth's Travels in the Caucasus and Georgia. The superstitious notions and habits of such people, without any reference to the peculiarities of cerebral development, invariably give rise to and determine their individual dispositions. And as nations, therefore, emerge from a state of barbarity, different circumstances operating on the same constitution excite feelings and principles of an opposite description, and produce in every respect a striking revolution of character. Thus the Goths on their first invasion massacred indiscriminately man, woman, and child, and every where betrayed the most furious cruelty; but, after their intercourse with the Europeans, the same people became remarkable for their humanity.' The delight which it gave the Romans to witness the combats of the gladiators, and the cruel sports of the circus, that soil prolific in crimes which gave rise to a Nero, a Domitian, a Caligula, is afterwards adverted to, as well as those 'European sovereigns of Christian countries, over the record of whose actions the veil of humanity might well be drawn.'

'Whether at such calamitous eras, we contemplate,' says the writer, 'the demon-like Robespierre, Murat, or Carrere, resting amidst the anarchy of cruel and licentious passions; or whether we turn our eyes to the horrors of the Sicilian vespers, or the massacre of Bartholomew, and see the infuriated enthusiast committing outrageous murder within the sanctuary of the church itself; the desire and propensity to destroy will be found in every instance to be a feeling suggested and excited by the influence of incidental circumstances, and the prevailing spirit and temper of the times, rather than the result of a particular configuration and development of a certain part of the brain, urging the individual by its mechanical activity to the commission of the most atrocious crimes.'

We now proceed to extract from a writer whose opinions and sentiments will always command respect, as resulting from a mind at once highly gifted with the power of judging on abstract questions, and proverbially free from bias in favor of established principles, merely because they are established.

'While,' says Mr. Abernethy, 'I must readily concede to what is demanded in this system of organology, that the variety of effects produced may be the result of modifications of vital actions, transmitted through diversities of structure, I must strongly protest against the opinion that the organs themselves are perceptive; or, indeed, against any opinion which impugns the belief of the unity of that which is perceptive, rational, and intelligent. Many of our actions are the results of complicated thoughts and feelings, each seeming to have yielded a portion of its peculiar interests so as to produce a modified result. But how, may I ask, has this compromise been made? A gentleman once humorously answered this question by saying, that it was done by committees of the several organs, and a board of control. But if an intelligent, discretionary, and controlling power be granted, I feel no disposition to demand any more.'

'I had great gratification,' Mr. A. remarks in another part of his pamphlet, 'in being intimate with Dr. Spurzheim whilst he remained in London; and in a kind of badinage I proposed to him questions which he answered with facility, and in a manner that showed a perfect knowledge of human nature. For instance, I enquired whether he had discovered any organ of common sense; and he replied in the negative. I then demanded in what that quality consisted? and he answered, in the balance of power between other organs. This answer shows why a quality so peculiarly useful is common to all, and rare in any; for there are but few who have not prejudices or partialities, hopes or fears, or predominant feelings which prevent them from pursuing that middle and equal course of thought and conduct which unbiassed consideration or common sense indicates and directs. I enquired of Dr. Spurzheim if there was any organ of self-control, or, if not, whence that power originated? He said 'it is the result of a predominating motive; thus justice may control avarice, and avarice sensuality.' In short, I readily acknowledge my inability to offer any rational objection to Gall's and Spurzheim's system of phrenology, as affording a satisfactory explanation of the motives of human actions.'

From the avowed enemy, in the first instance, and the qualified friend in the second, to the tenets under dispute, we now turn to an article published in No. 3, of the Foreign Quarterly Review; which we regard as one of the most able expositions of the doctrine of phrenologists that ever demanded the public attention.

'The metaphysics,' says the Reviewer of phrenology, 'pretend to greater validity than all other systems, yet it is not thus that we, its votaries, maintain it, but by the relation of cerebral developement to mental manifestations. It is upon facts confirming this relation that we proceed, and the number which we have collected exceeds all belief. The collection of Dr. Gall, that of Dr. Spurzheim, of Mr. Deville, whose zeal and activity in promoting the practical part of the science cannot be sufficiently commended; those of the phrenological societies of London, Edinburgh, and many other places, contain many thousands of facts which are incontrovertible. It is not in the power of any phrenologist to irregister all living examples, but we build our

pretensions upon every age of the world, and call not only moderns but ancients to our aid. As this is one of the most curious parts of our pretensions it must be briefly noticed. Every head which has been handed down to us from antiquity is in as exact conformity with our doctrine as if we ourselves had moulded it for our own purposes. The bad Roman emperors, Caligula, Nero, Caracalla, have the regions where the inferior faculties reside very much developed, while the antagonist faculties are small. The Antonines have heads that would do honor to any man. Vitellius is a mass of sensuality, deprived of all elevation. The Roman Gladiator most powerful in the basilary region has a narrow and contracted forehead, where little reason could reside. In Homer the development of ideality is immense, and still greater perhaps in the rapturous Pindar. In Demosthenes there is a fine show of the superior faculties, but the organ of language is not the most prominent, neither were the natural command and flow of words the characteristics of his eloquence. His desire of gain too is largely developed. The head of Socrates is such as Drs. Gall and Spurzheim would model to demonstrate the organ of marvellousness, and a mind of visions; and so is a head more modern, that of Torquato Tasso. The head of Zeno is that of a profound and moral thinker, as he was. That of Seneca has much bad but more good, so balanced that a struggle between them will be necessary, but the latter will generally prevail. The head of Cicero, larger on one side than the other, has more language than Demosthenes, with large reflecting faculties, vanity, the desire of gain and of fame, and cautiousness, great with little hope, and little courage. In short, the example of antique statues in our favor are innumerable. Now, either these heads are genuine casts, or they are not. If casts, their perfect coincidence with the respective characters most phrenologically proclaims, what all men, indeed, long since have known, that nature has acted in all ages by immutable laws. If they are not casts, but ideal heads, then the ancients had observed the fact that a certain form of head regularly accompanied such a power of mind; and their sculptors, without accounting for it, registered it in their works.'

We now proceed to a more regular development of the subject before us; and the order we intend to pursue is, first to give a brief history of the circumstances which led to the conception of the organological hypothesis, then describe the present condition of the assumed science, engage in an investigation of the arguments for, and objections against, its becoming substantively as a body of legitimate doctrine; and conclude with a few corollaries containing our own inference.

'In the ninth year of my age,' says Dr. Gall, 'my parents sent me to one of my uncles, who was a clergyman in the Black Forest, and who, in order to inspire me with emulation, gave me a companion in my studies. I was, however, frequently reproached for not learning my lesson so well as he did, particularly as more was expected from me than from him. From my uncle we were both put to school at Baden, near Rastadt, and there, whenever our task was to learn by heart, I was always surpassed by boys who, in their other exercises, were much my inferiors. As every one of those who were remarkable for this talent had large and prominent eyes, we gave them the nick-name of ox-eyed. Three years after this we went to schooi at Bruchsa, and there again the ox-eyed scholars mortified me as before. Two years later I went to Strasburgh, and still found that, however moderate their abilities in other respects, the pupils with prominent eyes all learnt by heart with the greatest ease.

'Although,' continues our author, 'I was utterly destitute of previous knowledge, I could not help concluding that prominent eyes were the mark of a good memory; and the connexion between this external sign and the mental faculty occured to me. It was not, however, till some time afterwards that, led on from observation to observation, from reflection to reflection, I began to conceive that since memory has its external sign the other faculties might very well have theirs. From that moment every person remarkable for any talent, or for any quality, became the subject of new attention, and all my thoughts were directed to a minute study of the form of their heads. Little by little I ventured to flatter myself that I could perceive one constant shape in the head of every great painter, of every great musician, of every great mechanic, severally denoting a decided predisposition in the individual to one or other of these arts. In the mean time I had begun the study of medicine, where I heard much about the functions of the muscles, of the viscera, &c., but not a word about the functions of the brain. My former observations then recurred to me, and led mé to suspect, what I afterwards proved, that the form of the skull is entirely due to the form of the viscus which is contained in it. From that instant I conceived the hope of being able one day to determine the moral and the intellectual faculties of man, by means of his cerebral organisation, and of establishing a physiology of the brain. I therefore resolved to continue my researches until I should obtain my object or find it impossible. The task would have been less difficult had I abandoned myself entirely to nature. But I had already learned too much of the errors and prejudices then taught upon those subjects not to be biased by them, and I was still farther entangled by the doctrines of metaphysicians, who teach that all our ideas come by our senses; that all men are born alike, that education and accident alone make them differ. If this be true, said I, no faculty can have an external sign, and to study the brain in parts and its functions is absolute madness. Still I remembered my former observations; I knew that the circumstances in which my brothers and sisters, my school-fellows, my playmates, had from their infancy been placed were all alike. I saw that education was bestowed in vain on some persons, that others had talents without it. I observed a proportionate variety in the disposition of animals. Some dogs are born hunters, while others of the same litter cannot be taught; some are peaceful, some

ill-tempered. In birds there is a similar diversity. The whole animal kingdom spoke then in favor of my strong surmises, and I resolved to prosecute my plan. It was not till thirty years had been spent in uninterrupted study in observing men of every description, and in many countries, men remarkable for some talent or some defect, for some vice or some virtue, in studying inferior animals, domestic or wild, the inhabitants of air or of earth, that I ventured to embody my observations, and publish them in one comprehensive work.'

In Dr. Spurzheim's physiognomical work, published several years since, we find a collection of facts, some almost exceeding belief, illustrative of the principles both of the variety and inconsistency of the human character—by inconsistency we mean, that talents and virtues are manifested by some individuals, accompanied by the negation of other faculties, which, à priori, we should suppose to be their accompaniments; or the display of opposite qualities which renders the totality still more remarkable. We are told, for instance, of a virtuous, and humane, and benevolent individual, delighting in the murderous horrors of war, and becoming chaplain to a regiment in order to give him the chance of witnessing these sanguinary spectacles. Of another person we read, who at the same time was gifted with such high religious impressions and such thievish propensities that, in the voluntary act of confessing and deploring to his spiritual director ' his natural tendencies,' he was found in the act of stealing the confessor's watch! Such and many more marvellous inconsistencies of character and conduct will be found interspersed among the writings of Spurzheim and other of the phrenologists; but any man of the most slender observation, and who has the smallest correspondence with the world, will have constantly before him examples enough of this variety and inconsistency.

It would be out of place to enter minutely into the very curious process of organic evolution from the primordial germ. Under the word Brain we have already adverted to it, and shall have occasion to treat of it more fully when writing the article Physiology. It may suffice here to state that, although much remains to be known on the growth of brain, nerve, and bone, it is sufficiently manifest that nervous and membraneous matter take the precedence of osseous formations, and that the evolution of brain is not interfered with by bony casement, but that the ossific deposit waits to be directed by cerebral expansion; and that the hardening of the skull is subsequent to, and, as we have said, directed by, the organisation of the nervous system; of which system even the brain itself is the last to be fully formed. It may here, however, be further just intimated, that the bony envelopment of the brain, or, as we commonly express ourselves, the skull, consists of two layers, and that the outer and inner surface are not in all instances and at every part completely in correspondence. This fact has, indeed, been brought forward in disproof of craniological pretension; but, as we are not yet on the head of objections to the system, we must for the present defer any other remarks in reference to this particular.

It is now time that we state what we have just called the topography of this system of organology, or in other words mention the different localities of the different powers which have been determined on by the two great promulgers of the doctrine. Here we extract from one of the reviews before us; but the reader may depend upon the accuracy of the statements; and we rather prefer borrowing from the later publications than extracting from the original works themselves, on account of the somewhat fluctuating state of the pretended science (we must not assume its validity), and the consequent variations of nomenclature and position that are occasionally introduced into its terminology. Indeed we shall find that Gall and Spurzheim do not entirely agree in all particulars, either as to place or name.

To the list given by Dr. Spurzheim, we shall add from the work of this author, which the reviewer has neglected to do, the part of the brain in which the faculties are supposed to reside.

Dr. Gall's Diagram, with the German Names Translated.

No. 1. *Zeugungstrich.* The instinct of generation.
2. *Jungerliebe, Kinderliebe.* The love of offspring.
3. *Archanglichkeit.* Friendship, attachment.
4. *Muth, Raussinn.* Courage, self-defence.
5. *Würgsinu.* Murder, the wish to destroy.
6. *List, Schlauheit, Klugheit.* Cunning.
7. *Eigenthümsinn.* The sentiment of property.
8. *Stolz, Hochmuth, Horschsucht.* Pride, self-esteem, haughtiness.
9. *Eitelkeit, Rhumsucht, Ehrgeitz.* Vanity, ambition.
10. *Behütsamkeit, Vorsicht, Vorsichtigkeit.* Cautiousness, foresight, prudence.
11. *Sachgedächtniss, Erziehungs, fähigeit.* The memory of things, educability.
12. *Ortsinn, Raumsinn.* Local memory.
13. *Personensinn.* The memory of persons.
14. *Wortgedächtniss.* Verbal memory.
15. *Sprachforschungssinn.* Memory for languages.
16. *Farbensinn.* Colors.
17. *Tousinn.* Music.
18. *Zahlensinn.* Number.
19. *Kunstsinn.* Aptitude for the mechanical arts.
20. *Vergleichender Scharfsinn.* Comparative sagacity, aptitude for drawing comparisons.
21. *Metaphysicher Tiessin.* Metaphysical depth of thought; aptitude for drawing conclusions.
22. *Witz.* Wit.
23. *Dichtergeist.* Poetry.
24. *Gutmüthigkeit, Mitleiden.* Good nature.
25. *Darstellungssinn.* Mimicry.
26. *Theosophie.* Theosophy, religion.
27. *Festigkeit.* Firmness of character.

Dr. Spurzheim's arrangement of faculties is comprised in orders, genera, &c.; they are:—

Order I.—FEELINGS, OR AFFECTIVE FACULTIES.

Genus i. PROPENSITIES. No. 1. *Amativeness.* Situated in the neck. Discover the mastoid process behind the ear, and the protuberance of the occipital spine above the middle of the neck, the space between these two elevations indicates the extent of this organ. No. 2. *Philoprogenitiveness.* Protuberance upon the posterior part of the skull. No. 3. *Inhabitiveness.* No. 4. *Adhesiveness.* Lying on the lateral and back part of the head. No. 5. *Combativeness.* On that part of the head which corresponds to the posterior inferior angle of the parietal bone, behind the mastoid process. No. 6. *Destructiveness.* On the side of the head, immediately above the ears. No. 7. *Secretiveness.* In the middle of the side of the head, above the organ of the propensity to destroy. No. 8. *Acquisitiveness.* At the temples, on the anterior inferior angle of the parietal bone. No. 9. *Constructiveness.* Development of the brain at the temples.

Genus ii. SENTIMENTS. No. 10. *Self-esteem.* An elevation in the midst of the upper posterior part of the head. No. 11. *Approbativeness.* 'Development of the upper posterior and lateral part of the head is observed in persons who are very fond of being caressed, honored, and applauded; in short, who are ambitious.' No. 12. *Cautiousness.* Cautious persons are extremely large on the upper posterior part of both sides of the head.

Genus iii. SUPERIOR SENTIMENTS. No. 13. *Benevolence.* Superior middle part of the forehead elevated and prominent. No. 14. *Veneration.* Head generally elevated in the middle of its upper part. No. 15. *Firmness.* 'Dr. Gall observes that persons of a firm and constant character have the top of the brain much developed.' No. 16. *Conscientiousness.* On the side of the organ of firmness. No. 17. *Hope.* On the side of veneration; as is No. 18. *Marvellousness.* No. 19. *Ideality.* An enlargement above the temples in an arched direction. No. 20. *Mirthfulness*, or gayness. No. 21. *Imitation.* An elevation of a semiglobular form at the upper part of the forehead.

Order II. UNDERSTANDING OR INTELLECT. EXTERNAL SENSES, FEELING, TASTE, SMELL, HEARING, SIGHT.

Genus ii. PERCEPTIVE FACULTIES. The intellectual faculties which perceive the existence of external objects, and their physical qualities. No. 22. *Individuality.* Lower part of the forehead very prominent, indicating a development of the anterior inferior part of the brain. No. 23. *Configuration.* 'The organ of form seems to be placed in the internal angle of the orbit.' No. 24. *Size.* Near the former. No. 25. *Weight.* In the neighbourhood of form and size. No. 26. *Color.* 'The external sign of a great development of the organ of this faculty is a vaulted and round arch of the eyebrows.

Genus iii. INTELLECTUAL FACULTIES, which perceive the relations of external objects, and their physical qualites. No. 27. *Locality.* 'At the eyebrows, toward the middle line of the forehead, a protuberance on each side reaching to the middle of the forehead.' No. 28. *Calculation.* 'In calculating individuals the arch of the eyebrows is much depressed or elevated at the external angle of the orbits, proving a greater development of brain behind this place.' No. 29. *Order.* 'Its organ is probably situated outward, not far distant from the organs of size and space.' No. 30. *Eventuality.* No. 31. *Time.* Between the organs of individuality, space, order, time, and cause. No. 32. *Melody.* 'A great development of this organ enlarges the lateral parts of the forehead.' No. 33. *Language.* Prominence of the eyes.

Genus iv. REFLECTIVE FACULTIES. No. 34. *Comparison.* An elevation in the middle of the upper part of the forehead, presenting the form of a reversed pyramid. No. 35. *Causality.* 'The superior part of the forehead much developed, and prominent in a hemispherical form.'

As an apology for his nomenclature Dr. Spurzheim introduces the following remarks in the preface to his physiognomical system. 'Having formed new names, it is my duty to state my reasons for so doing. The English language presents very few single words which express my conception of the peculiar faculties of the mind. Hence I was obliged to speak either by circumlocution, or to make new names. Now I think, with Locke, that in this respect we have the same right with our predecessors, and I therefore propose new single names, which I have formed as much as possible conformably to the spirit of the language. Having established different propensities as peculiar faculties of the mind, in order to designate propensity I have taken the termination *ive* as indicating the quality of producing, and *ness* as indicating the abstract state; I have therefore joined *iveness* to different roots, among which I have given the preference to English words generally admitted. When I could not find such, I chose Latin participles, which in English are so common, even in expressions which denote a meaning similar to that which I look for, as destructiveness, productiveness, &c.'

We shall conclude this part of the subject by extracting the following remarks of Dr. Elliotson on the general and relative localities of the organs and faculties:—

'The exact situation of the organs,' says Dr. E., 'can be learned from drawings or marked heads only. I shall therefore confine myself to remarking, 1. That the organs of the faculties or qualities common to man and brutes are placed in parts of the brain common to man and brutes, at the inferior posterior, the posterior inferior, and inferior anterior parts of the brain, i. e. of the instinct of propagation, the love of offspring, the instinct of self-defence, of appropriating, of stratagem, &c. 2. Those which belong to man exclusively, and form the barrier between man and brutes, are placed in parts of the brain not possessed by brutes, viz. the anterior superior, and superior of the front, i. e. of comparative sagacity, causality, wit, poetic talent, and the disposition to religious feelings. 3. The more indispensable a quality or faculty, the nearer are its organs placed to the base of the brain, or medium line. The first and most indispensable, the instinct of propagation, lies nearest the base; that of the

love of offspring follows. The organ of the sense of localities is more indispensable than that of the sense of tones or numbers; accordingly the former is situated nearer the medium line than the two latter. 4. The organs of fundamental qualities and faculties which mutually assist each other are placed near to each other, i. e. the love of propagation and of offspring, of self-defence, and the instinct to destroy life, of tones and numbers. 5. The organs of analogous fundamental qualities and faculties are equally placed near each other; i. e. the organs of the relations of places, colors, tones and numbers, are placed in the same line as well as the organs of the superior faculties, and the organs of the inferior propensities.'

'Although,' continues Dr. E., 'the arrangement of the organs is so beautiful, we must not imagine that Gall mapped out the head at pleasure, according to preconceived notions. He discovered one organ after another, just as it might happen, and often one became known to him situated very remotely from the organ last discovered. The set of organs discovered by him turned out as it is, and a strong argument is thus afforded to the truth of his system.' 'I defy,' says he, 'those who attribute my determination of the fundamental faculties and of the seat of their organs, to caprice or arbitrary choice to possess a tenth part of the talent necessary for the most obscure presentiment of this beautiful arrangement, once discovered, it displays the hand of God, whom we cannot cease to adore with wonder increasing as his works become more disclosed to our eyes.'

In the allusion we have above made to the *anatomical* or physiological part of the organic system of Gall and Spurzheim, it was stated that although the gradual evolution of the brain regulated the form and size of its bony covering, the skull, this same skull consists of two layers or tables, as anatomists express themselves, which are separated from each other by a reticular network, which is interposed between them. Now, were these two tables always in complete parallelism, the circumstance of there being two would not affect cranioscopical inference, but as this is not precisely the case, even by the confession of the organists, the objectors to the doctrine think themselves entitled to be heard when they advance the want of correspondence between the outer and internal layer of bone, in proof that the exterior elevation, or depression, or expansion, cannot be taken as a correct index of the direction and form of the brain immediately under the protuberance.

In reply to objections of this kind, and in allusion to the two bony layers of which we are now speaking, Dr. Spurzheim expresses himself in the following manner :—'These two tables are scarcely perceptible in children, they are distinct in adults, but their distance one from the other is not very considerable. In general, from birth to the period when the brain begins to diminish in size, it is possible and easy to distinguish the size of the brain by considering the size of the skull. For there never is an empty space between the skull and the brain, and both tables are not distant enough to invalidate our assertion. It is objected that both tables are not parallel, and that for this reason it is impossible to measure the size of the brain and its parts, according to the size and form of the skull. This objection falls to the ground as soon as our method is known. It is not necessary to appreciate the minute difference of size, in order to distinguish the development of the organs. These occupy a large surface, and they present a very different size from the lowest to the highest degree of development.' It is also to be considered that we only intend to distinguish the size of organs, and that it is essential not to confound this idea with that of protuberances. If one organ be much developed, and the neighbouring organs very little, the developed organ presents an elevation or protuberance; but, if the neighbouring organs are developed in proportion, no protuberance can be perceived, the surface is smooth. Now this may happen if the organs are much or little developed. Every individual has all organs; and it is only to be determined whether the whole brain, or one, or several parts are more or less developed.

There is another anatomical difficulty, which we believe in the general way is considered more formidable than the one above announced, we mean that of the frontal sinuses.

'It is of considerable importance to ascertain how far these sinuses generally extend, and how many of the phrenological organs they generally affect. This question is easily determined by an appeal to fact. A considerable number of crania have lately been opened with this view, and it appears that the frontal sinuses extend over a greater surface than has hitherto been supposed. Sir William Hamilton, in a lecture at the Edinburgh University, exhibited the open crania belonging to that museum, with a number of other specimens, and thereby demonstrated that these sinuses, which are very unequal in their extent and depth, affect frequently as many and often more than one-third of the principal phrenological organs; and that the retirement of the internal table, from the irregularities and protrusions on the external, is so considerable as to render it impossible to discover by any external manipulation the general size and development of the particular parts of the brain.'

Mr. Combe, perceiving it necessary to make some reply, delivered a lecture on the same subject in the Edinburgh Assembly Rooms, producing all the counter specimens he could find. As this question is one which must be *ultimately* decided by the number of facts brought forward, and as Sir William Hamilton's collection of crania was so very extensive, it was incumbent on the phrenologists to bring into the arena, not only the *select* specimens which they have been gathering in their own museum, but as many other examples as they could possibly collect. Mr. Combe, aware of this fact, has announced to the public that he triumphantly refuted Sir William Hamilton's demonstration, not simply by the collection of skulls from the Clyde Street Hall, but by the whole of the open crania from a private museum.

We suspect there must be some misunderstanding or misrepresentation in reference to

the particulars of this lecture; for Mr. Stone declares the additional skulls to have consisted only of that of an infant two years old, and two of full grown persons. Mr. Combe (who beside the guarantee which general respectability of character gives against any unmanly subterfuge, is proverbially a candid and impartial advocate) would never, we should conceive, have been desirous of deceiving the public by intimating that he was speaking of a considerable collection, which only in point of fact consisted of two and a half.

With respect to the objection itself of the frontal sinus, we shall allow Dr. Spurzheim again to speak. 'Our adversaries say that, on account of the frontal sinuses, the organ of space cannot be distinguished. The development of this organ, however, and the frontal sinuses, present quite different forms; the frontal sinuses only form a bony crest, and the isolated protuberance which indicates the particular development of the organ of space is round and large. Sometimes the organ of space is very considerable, and at the same time there are frontal sinuses; then the bony crest is perceived, and at the same time this part of the forehead is prominent.' He has subsequently said, as reported by Mr. Stone, that 'the frontal sinuses are generally wanting in children and young persons, and adults, and that they occur only in old persons, or after chronic insanity.' 'The absence of the sinuses,' Mr. S. replies, 'in young and adult persons is, on the contrary, exceedingly rare; so much so as to have escaped the observations of Palfin, Bertin, Portal, Soemmering, Caldani, and other anatomists.'

Another anatomical objection has been urged against the system, inasmuch as the organs are not confined to the surface of the brain, but extend allowedly through its whole mass. To this objection Dr. S. replies, 'true it is the organs are not confined to the surface of the brain; they extend from the surface to the great swelling of the occipital hole (medulla oblongata), and probably to the commissures; but, as the peripheric expansions of the five senses indicate the development of the respective nerves, so the convolutions of the brain denote a larger or smaller development of the whole cerebral mass. This will be understood by analogy. Animals which have a large external apparatus of smell, large nostrils, large turbinated bones, a large expansion of the pituitary membranes, consequently a very considerable nervous expansion, have the whole olfactory nerve very much developed; and it is possible to measure the development of the nerve in general according to its peripheric expansion.'

Comparative anatomy has been brought to bear against cranioscopical pretence. Allowing it is urged that the less complicated organisation of the cranium in man than in animals, and its less dependence upon the facial bones, may give room for supposing that the size and form of the brain can be judged of from the external configuration of the skull; yet this cannot be the case in the inferior animals, since their crania are often so formed that the greatest prominences of bone are answerable to those very parts in which the brain is the least developed. 'In the lion, tiger, wolf, &c., the temporal bone is externally most depressed over the part where the subjacent brain is most fully developed; and the zygoma of the bone is prominent in those animals, and extends over the part where it is least developed.' Granting, say the phrenologists in reply, that such is the case, conceding that the cranioscopical difficulties may be greater in one race of animals than in another, yet we find the argument good in all so far as it does extend, and where the brain's development is displayed by the exterior shape and size of parts; thus will the doctrine be found illustrated even among the brute creation. The courageous animals, Dr. Spurzheim tells us, even without reference to their size or kind, 'have the head between and behind the ears very large.' This is an unfailing sign to distinguish or recognise if a horse be shy and timid, or bold and sure. The same difference is observed in game cocks and game hens in comparison with the domestic cock. 'Fighting cocks,' he adds, in another place, 'are less than dunghill cocks, and hares are stronger than rabbits, though less courageous;' so that courage does not depend upon, or show itself necessarily connected with, magnitude and strength.

The *pathological* weapons with which phrenology has been combated appear to be of the most formidable kind. How is it possible, consistently with your tenets of an organ for this and an organ for that faculty, that the brain should sometimes be wounded, part of it torn away, extensively diseased, occasionally ossified throughout its whole extent, or dissolved in water, as in cases of chronic hydrocephalus? How is it possible, the anti-phrenologists say, that all these things should occur and the manifestation of faculties continue through life, as if nothing had happened to one or several of your assumed organs, while upon your own principles these should not only be injured but actually destroyed?

Your arguments, say their opponents, prove too much, and you must give up your own notion of the brain being at all necessary in the manifestation of mind, before you can ground any valid objection to the phrenological doctrine, on the principle that morbid conditions of the cerebral organ may exist without the lesion being always manifest by those marks which one should suppose must of course stamp the nature of the received injury. And in truth the pathologist and medical practitioner meet with a great deal in this way which is exceedingly mysterious and puzzling upon any hypothesis of cerebral condition. Nor is it in the brain alone that these pathological puzzles are often presenting themselves; and we have just popped upon a paragraph, in turning over the pages of Spurzheim's book, which we may as well extract as express the same thing in our own words—'It is true,' says he, 'that very considerable injuries of the brain produce sometimes very slight perturbations in the manifestation of the mind, and that very slight injuries of the brain are accompanied often with the most violent accidents. But this also happens in other parts of the body. Some-

times very considerable abscesses are found in the lungs without a considerable preceding derangement in the respiration. Are not the lungs, therefore, the organ of respiration? Sometimes ossifications are observed in the heart without any remarkable disturbance of circulation; is not, therefore, the heart the organ of circulation? Hence it is wrong to attribute to the wound, or to its seat, what must be attributed to the particular irritability of the sick person. Thus we may explain why often no accident results from a very considerable wound of the brain; namely, in patients whose irritability is very weak; while in very irritable persons, very slight wounds produce the most serious consequences.'

Then, again, the organologists urge the vague and marvellous way in which most of the tales of morbid condition of brain are told.

'If,' say Drs. Gall and Spurzheim, and their associates, 'all these observations were as correct as their authors state them to be, not only phrenology would be subverted ab imo fundo, but it would be impossible to maintain that the brain performed any intellectual functions, or indeed any functions except that of terminating the columnar structure of man with a round nob, on which Quakers hang broad brimmed hats. Were the mass, said to be fibrous, converted to bone without a loss of any faculty, vital, animal, intellectual; were it really liquid and addled as it then might be, and no thought or action weakened, this surely is the irresistible consequence. But the vague and indefinite manner in which all these examples are produced save the head and its contents from the imputation of being useless appendages, and give phrenology a chance of a little longer life than its opponents wish. In order to ascertain whether an injury done to any material organ is followed by the disease of any function, the direct method is, to observe whether the function attached to that organ is diseased or not. Thus let loco-motion be supposed to depend upon the soleus maximus muscle; to ascertain this we should observe whether, when this muscle is injured, the power of loco-motion be impaired or not. The same process should be followed with the brain; if an ounce or two of the organ of cautiousness be carried away, as in one case it seemed to have been, we should not examine whether the faculty of music, or eventuality, had been diminished or increased, but whether the poor patient were more or less cautious than he was before. What we do maintain is that our predecessors and opponents did not possess the due means of observing the facts which they have stated; for, instead of looking to the faculties which we attach to the injured part above quoted, they endeavour to find there not merely powers which do not belong to those parts, but powers which we do not allow to exist in man as simple fundamental faculties, perception, memory, judgment, imagination, &c. These indeed, as understood by the doctors of the old school, may very well survive a partial lesion of the brain.'

Another loop-hole, as it would be called by their enemies, do the phrenologists employ in endeavouring to get through the difficulties of cerebral lesion, unattended with corresponding injury, namely, the duplicity of the nervous system with the brain at its head. Let the whole side, they say, of the head be involved in disorder, yet, if the opposite side maintain its integrity, the individual may continue to preserve and manifest the faculties of the parts without much observable difference in power, just as the faculty of vision is maintained after the loss of one eye. We are told, indeed, by Spurzheim some rather curious tales in illustration of this principle, and such as, were we decidedly friendly to one side of the argument in the way of partizanship, we should be rather inclined to keep in the back ground of the phrenological picture. However, one of them which strikes us, and will strike our readers, as the most marvellous, is not given by Spurzheim himself, but by another anatomist of celebrity who knew nothing of the doctrine now canvassed. Spurzheim says 'it is evident that both hemispheres of the brain may be in a quite different or even opposite state. Tiedeman relates the example of one Moser who was insane on one side, and who observed his madness with the other. Gall attended a minister who had a similar disease for three years. He heard constantly on his left side reproaches and injuries; he turned his head on this side and looked at the persons. With his right side he commonly judged the madness of his left side; but sometimes in a fit of fever he could not rectify his peculiar state. Long after being cured, if he happened to be angry, or had drunk more than he was accustomed to, he observed in his left side a tendency to his former alienation.' 'Every organ, every member of the human body,' says our reviewer, 'is double, and has long been acknowledged to be so. The fact has been doubted only since it became necessary to oppose phrenology.'

In the few words we have to spare on the *metaphysical* part of the argument, we must get the reader to revert to some of the quotations which have been introduced at the threshold of the present disquisition, and call his attention especially to that extract from Dr. Gall which traces the first conception of the phrenological scheme from the difficulty he (Gall) found in explaining the fact, that some boys whom he knew to be his inferiors in many things, were vastly his superiors in others; these instances are presenting themselves in abundance every day before persons who take the smallest pains to make any observation on character, and as long as we ourselves can recollect thinking on the subject of our own consciousness, its modes and manifestations, we remember to have been impressed with this difficulty on the hypothesis of general powers and leading fundamental faculties.

Were memory, general memory, a simple fundamental faculty, these partialities, if we may so say, which so frequently occur in the manifestation of its power would not be perceived; for be it observed it is not only those things which highly gifted individuals do not care about that they do not remember; but the very impotency of the attempt to recollect seems sometimes proportioned to the desire in persons to recal the impression originally made, while other

things, respecting which they are comparatively indifferent, rush upon the attention, become parcel of the mind, and are susceptible of recal by the slightest effort. 'How is it,' said Gall when a young boy to one of his school-fellows, 'that you contrive to find your way so easily through intricate places, through which you have only once been?' 'How is it,' retorted his companion, with the same feelings of surprise, 'that you contrive not to find yours?'

In respect to judgment the diversity is precisely the same, and even perception itself shall differ in a measure quite inconsistent with the assumption of general quantum of intellect in the perceiving person. To talk of accidental circumstances directing or creating an ear for sounds were surely to talk at random, and there is now living a prelate whose perception of music is of the nicest and most critical kind, but who is so deficient in the faculty of distinguishing colors that it constituted one of the pastimes of his children, when they were young, to place bodies before his eyes of different hues, that they might be amused with his mistakes; and yet this individual has, or had at the time we are speaking of, strong and correct vision. We recollect the late Dr. Gregory used to surprise his pupils by saying in his lectures, that what seemed evident to all others almost, was far from being so to him: viz. the fluctuation in abdominal dropsy; and, were we to add one instance to another as they occur to our recollection, we might fill page after page with recitals of what after all would but confirm a principle, or rather establish a fact, that stands in no need of confirmation or substantiating.

What do they prove? is the only matter that becomes a question; and to this it is difficult to give a reply that shall satisfy the enquirer whose object in putting the question is to find the truth at any rate; the phrenologists urge that the facts are inconsistent with those theories of mind which suppose perception, memory, judgment, imagination, are abstract and simple and fundamental faculties; and it is a curious fact that one of the most able reasoners who ever ventured into the regions of metaphysics has been successfully engaged almost simultaneously with the labors of the phrenologists in opposing these assumptions and abstractions even of the common sense school of metaphysics. Dr. Brown, versus Reid and Dugald Stewart, is almost the same thing as Drs. Gall and Spurzheim, versus the old metaphysico-physiologists, only that in the former case organology is not adverted to, while in the latter it is fons et origo omnium.

The unity of consciousness and the necessity of some pervading principle to insure personal identity are the principles which the anti-phrenologists assume to be quite inconsistent with the exercise of those several perceptibilities which are assumed on the other side; and they contend that perception, and judgment, and memory, must be regulated by certain laws, without reference immediately to the thing perceived, or judged of, or recollected, otherwise man would indeed be a bundle of inconsistencies, and no totality of thought, of feeling, of consciousness, could ever have place. Something like a statement of this kind will be found in an extract which we have already submitted from Mr. Abernethy's pamphlet.

Insanity has been urged both by the phrenologists and the anti-phrenologists as decisive in favor of their respective causes. How, will the latter set of men urge, can you make tally with your wild assumptions of separate organs for separate faculties the fact that the most trifling circumstance of excitation, that is trifling in itself and only formidable in its connexion and consequences, will prove sufficiently potent to drag steady reason, precipitately and in a moment, from its seat, and place in its stead the wildest, vagaries, and most unstable principles of thought and action. 'Il ne faut', says a French writer, 'qu'un atome deplacé pour te ravir cette intelligence dont tu parois si fier;' and even this displacement of an atom as a primary cause does not seem to be in all cases necessary; for mere mental circumstances will at times avail for the production of the highest and most permanent derangement.

Dr. Reid relates the case of a young lady who was one morning requested by her mother to stay at home; notwithstanding which she was tempted to go out. Upon her return to her domestic roof, she found that the parent whom she had so recently disobliged had expired in her absence. The awful spectacle of her mother's corpse, connected with the filial disobedience which had almost immediately preceded, shook her reason from her seat, and she continued ever afterwards in a state of mental derangement. Hill, in his treatise on insanity, speaks of a young lady, who, on her way to the post-office to enquire for letters from her lover, heard of his having suddenly died or fallen in battle (we quote from memory, and without much of the faculty of memory for things): but the consequence was confirmed insanity, and for years to come she went daily to the same post-office with the same fruitless enquiry.

Now, in what way can these sudden impulses with all their dread and complicated results be brought to harmonize with the position that assumes one organ for one faculty, and another for another, to a very large amount? Here is a blow hitting merely the thoughts and affections, but at the same time hurling to the dust all your twenty, or thirty, or forty organs, with all their appurtenancies and peculiarities.

Stop, say the phrenologists in reply, while we argue for the existence and operation of the several organs and faculties, we maintain that, for harmony of intellect and consistency of character, there must be an harmonious relation the one to the other, and that the temporary or permanent abolition of one or another will set all going wrong, just as the taking away a part or piece of complicated machinery shall necessarily interfere with the adjusted and regular motion of the whole. That he who says the organ of amativeness, must be sliced, or cut, or torn, or inflamed, or even excited or depressed before a person can go mad from love, assumes something which our theories do not permit him to assume. It is quite enough that any other organ or organs be deranged, either in their structure

or functions for this effect to to be produced; but the turn that the madnesss shall take will most likely be directed by that passion or sentiment which happened to be uppermost in the mind or brain of the individual at the moment when the impulse that overturned the reason made its rush upon the frame. It is further maintained by many of the phrenological school, and they assert that actual observation both before and after death shows the organ in many cases to be the seat of the morbid action; whose healthy workings give a character to the individual, but whose disordered condition imparts a character to the insanity.

With respect to the objections on the score of *morality* which have been propounded, the organological advocate enquires, Will you, can you deny, that in two individuals, virtuous inclinations, or vicious propensities are greater ab origine, and that consequently the vice of the one, and the virtue of the other, are in some measure constitutional? and whether does it matter that such inherent quality be traceable to brain formation, or be in some other inexplicable way connected and interwoven with the body and mind of the individual? It matters, rejoins the anti-phrenologist, in this way; that in one case, though the disposition or natural tendency to vice be great, there is connected with it a perception and allowance of virtue, and a freedom of will in choosing or refusing to listen to the commands of virtue; while, on the other, necessity and organisation are the commands to be obeyed, and if the organ of murder be of a given magnitude and strength it is that, and not the man, that plunges the dagger of death into the bosom of man. No such consequence by any means follows from our doctrine, say the supporters of phrenology; for besides that it is forming an erroneous estimate of our principles to suppose that magnitude of one organ determines the character, unchecked and unmodified by other sentiments and motives, the murderous act should be no more charged upon the organ of murder in our system, than it should be placed to the account of tendency or disposition in yours. All things flow from the will of the Almighty, so that, at least, without it nothing can be. Now, whether his pleasure be that good and evil, that the mingled nature of man, should be inherent in human organisation, or should exist independently of it, the fact of their existence is constant; the means alone are different. Whether it be by the fibres of his brain, or by his essential nature, that the created being becomes the perpetrator of harm, harm is not more or less his act—his lot. Whatever is, is by the will of God. If the will of God be fate; every doctrine which admits a God, endowed with will, as ruler of the universe, is fatalism; and divines and moralists are fatalists as we are. If too the influence of the Creator over human thoughts and actions be fatalism, it is fatalism whether exercised by spirit or by matter.

Whether then the system of phrenology leaves the doctrines of fate and necessity just as it found them, we leave for others to determine; we shall merely add, that all systems which endeavour to reconcile the necessity of actions with the free will and responsibility of man are necessarily in their nature nugatory. All men sufficiently know the fact, whether they be materialists or immaterialists, organologists or mentalists; but all ought at the same time to know that every other appeal than that to 'the man within the breast,' to the consciousness and conscience of the individual, is worse than nothing. No organic or anti-organic speculations will do; no fearful presentiments of the consequences of truth being ascertained in any way, and to any extent, will avail; no immaterial physiology, forced from an university professor, by virtue of his office, will answer; no, it must be by alarming the conscience, and resorting to the motives of love and of fear, by letting the physiological champions fight their own battles, and by wielding other weapons than those with which an earthly warfare is waged, that the individual or individuals can expect to succeed who stand as messengers of peace or of woe between man and his Maker. 'All theory,' says Dr. Johnson, 'is against the freedom of the will; all experience for it. We know that we are free, and there's an end of it.' Without professing to advocate phrenology on this, or indeed on any other ground, we have thought it right to say thus much on the score of alleged consequences; and we think it right further to state, that, whether consistently or not with their positions and tenets, the phrenological writers and teachers all along urge the vast importance of aiming to correct and to combat vicious speculations.

We will add, although not ourselves unqualifiedly disciples of the cerebral philosophy in question, most of our friends who are so, are at the same time men who as unhesitatingly avow their respect for, and confidence in religion as a source of morality. We recollect a near relation returning from Scotland some time since with a simultaneous conviction that the doctrines taught by the phrenologists, and the doctrines taught by Dr. Chalmers, were, the former founded in nature and truth—the latter, the truth itself. By this association of inferior and higher things, it will be sufficiently evident that we mean nothing disrespectful; our only aim and wish being that of freeing a system, which may or may not be correct, from the unmerited obloquy of some who malignantly, and therefore improperly, oppose it.

But it is time to come to our last particular, that of the collocation of facts; and here one might imagine the matter would end. By this appeal one should suppose the question would speedily be set at rest, and the examiner would it might be thought succumb to testimony who should refuse to be convinced by argument. Unfortunately however, facts in philosophy, that is in disputed philosophical creeds, are like facts in medical science, convincing or not, according to the conceptions and belief of the persons who are called upon to witness them. It will be amusing, and we should hope instructive, to the reader to have presented before him the same example from an enemy and a friend to the cause of craniology, in the instance of an individual whose history

and fate made but a very short time ago considerable noise in the world: we mean Thurtell, the murderer of Weare.

'It is really impossible to look at the development of Thurtell,' says Mr. Stone tauntingly, 'and seriously believe he murdered Weare; the poor man must surely have been innocent, and executed by mistake, for he possesses the organ of adhesiveness, which disposes to 'fervour and constancy of affection' very large, and it is unlikely, with such a development, that he would have murdered his friend; that of veneration which gives rise to 'religious sentiments,' and 'respect and deference to persons' large; and benevolence, the source of every generous feeling, very large. How is it possible, therefore, to reconcile these indications with his real character? The difficulty is solved by the phrenological report, which shall speak for itself. 'The murder committed by Thurtell was a predetermined cold-blooded deed; nothing can justify it. Revenge against Weare for having gambled too successfully, and, as he imagined, unfairly with him, prompted it; but there is every probability that Thurtell laid the unwarrantable unction to his soul, that he would do a service to others by destroying Weare. He considered Weare as a complete rascal, one who had robbed many as well as himself, and one who, if he lived, would have robbed many more.' Thus the organ, continues Mr. S., is made to excite the organ of murder, and the phrenological deduction is characteristic of all the beauty, excellence, and purity of its philosophy.'

Now let us hear what the reviewer in the foreign journal advances on this same fact of Weare's murder, and the phrenological circumstances connected with its perpetrator.

'Our adversaries,' he says, 'have brought this incident forward to overwhelm us under the many weights of phrenological, moral, and religious perverseness. Our doctrine has been reproached with finding in the head of the assassin Thurtell a large development of benevolence, and thus making him out to be a harmless, good-natured person, and not the atrocious, cool-blooded murderer, who could brood for days and nights over iniquity.'

'Surely the persons who make such an allegation as this must have been scared by their dread of phrenology out of all they ever knew of human nature, if they cannot perceive that the same man does at one moment an act of kindness and at another an act of cruelty; that he is at one moment just, at another unjust. What was Augustus persecuting and proscribing, and Augustus emperor? What was Nero a stripling, and Nero when he saw the city blazing? What is every man whom we have ever known? Is there not a true but common cant about the mingled nature of the human species; about the good and evil of our hearts, which shows the inordinate absurdity of such a remark, and might dispense us from all further answer? But let us examine facts, and see, not from his head but from his biography, what Thurtell was:

'Thurtell being applied to in behalf of a friend in distress, drew out from his pocket his last remaining half sovereign, and said 'give him the half of this; but no, he wants it more than I do, he is sick, give it him all.' He once incautiously caused a quarrel between two friends, and shed tears of tenderness over their reconciliation. His kindness to Hunt excited as much gratitude as Hunt was capable of feeling. His affection towards all his family was extreme, and his attachment to his friends inviolable; his general character when lieutenant on board the Adamant in the Leith roads, was that of a dashing, thoughtless, good-hearted officer. Yet from his early youth he was irascible, and what was called a murderous shot, a very dare-devil, a kind of prize-fighter, a notorious liar, a dupe of all his gambling associates; and he became a pre-determined cold-blooded murderer. These are facts; and let us now put different systems to the test by endeavouring to explain them:—Unity of mind, its indivisibility into various faculties, feelings, and propensities, can do it nearly as well as the indivisibility of the solar ray can explain the prismatic spectrum and the rainbow. This system needs not then much examination, and recourse must be had to some which admit a plurality of faculties. But which of these must be preferred? One that is hypothetical, or one which is founded in fact? All are subject to the same objection of admitting contradictory sentiments in man; and if phrenology falls by this objection all the rest must fall; and so indeed must facts. Whatever system does not admit a sentiment, or a combination of sentiments, to account for Thurtell's irascibility, his benevolence, his pugnacity, his attachment, his lying, his firmness, his tenderness, his cruelty, is defective. Let those who have leisure examine whether phrenology does not effect this more completely than all the others put together, and better than any that could be fabricated by this means. In truth no metaphysics but those of phrenology could account for the apparent contradictions in that man's mind; none which reject, as fundamental principles of human nature, benevolence, combativeness, attachment, destructiveness, secretiveness, firmness, can explain the facts of his life and character. If his charitable, generous acts be not totally denied, how would unity of mind reconcile them with the murder he committed? But the doctrine of the phrenologist says he had large benevolence, and this was sometimes very active; he had large combativeness, large destructiveness, and, when circumstances roused these into action, they were the more imperious because they were aided by a strong development of all the inferior propensities. The cerebral organisation of Thurtell, compared with his life, testifies as strongly in favor of phrenology as facts can do; and if the world had been told by any other tongue but that of our science that he, or any other murderer, had often done kind actions, the thing would have appeared quite simple, quite in conformity with daily observations. But the subterfuges which men take to evade conviction, when they are resolved that they will not be convinced, are wonderful.'

Such are the opposite accounts and opinions respecting the same fact or occurrence, as nar-

rated by an enemy and a friend to the philosophy of cerebral organisation; and, if we extend our collection and contrast from one into many instances, we shall still find the same discrepancy of sentiment, the same variation of feeling, as to the strength of facts, in aid of the cause. Non nos componere lites. Let the reader again read and judge for himself.

'Viewing phrenology,' says Mr. Stone, 'simply as 'a science of facts,' it is quite obvious that the facts which indeed constitute its very existence should be numerous, striking, and unequivocal; they should not be 'few and far between,' with ever and anon a confusion and doubt as to their identity; they should form a strong and irresistible body of evidence, sufficient to stifle the objections of the most scrupulous of sceptics. The doctrines of phrenology having been for many years industriously promulgated, in 1828 six gentlemen of the modern Athens, who, professing themselves of the phrenological system of Drs. Gall and Spurzheim, resolved themselves into a society for the purpose of 'collecting facts and preserving views that might enlarge the boundaries of the science.' Let us therefore enquire what has been their success? After the example of other more ancient and learned bodies, they proposed publishing their transactions;—a work which, if there had been the slightest truth in phrenology, would have been undoubtedly very interesting and valuable. Not so, however: the 'Transactions of the Phrenological Society,' ushered into existence beneath the auspices of the most zealous and sanguine of its enthusiasts, arrived only at the conclusion of the first volume, which soon floated down the red sea of literature, to the trunkmaker's warehouse, unnoticed, unreviewed, unlamented! Whether it sunk into oblivion from the heaviness of its metaphysical disquisitions, or whether it was discontinued in consequence of the editors having been gravelled for lack of matter, may yet be a problem to the publisher; but, certain it is, this work, of upwards of 400 pages, contains only eight phrenological facts, which, by the date of the institution and its transactions, appear to have been *four* years in accumulating. Thus died, in the first years of its existence, the 'Transactions of the Phrenological Society;' and the proceedings of this learned association have since only been transmitted in 'shreds and patches' to the phrenological journal, within the sybilline leaves of which we find only a heterogenous mixture of the most incoherent intellectual wanderings, and the coarsest personal abuse. This work has been published quarterly for the last five years. It has lately been supported by the principal phrenologists, and, after all, contains only *twenty* reports of cranial measurements; so that notwithstanding the great outcry that has been raised of the many evidences in favor of phrenology—notwithstanding the zeal of its advocates and their united perseverance—they have in this country only been enabled to concentrate within the pages of their leading works *twenty-eight* facts in support of their thirty-five organs.' 'And even these,' our pamphleteer adds, 'being selected partially, and measured only by the phrenologists themselves, cannot be admitted as, strictly speaking, impartial evidence.'

Now let us have an extract from the phrenological champion we have so repeatedly quoted in reference to this question, of whether facts speak for or against the system?

'If the Edinburgh Review,' says the foreign quarterly reviewer, 'has not been able to prevent the public attention from being directed to phrenology, and convinced by truth, still less has it been able to arrest the accumulation of *facts*; and the fifteenth number of the Phrenological Journal (page 467) contains, what in a certain slang dialect would be called such a *plumper*, that nothing softer than the reviewer's fact-proof cranium could resist it: Mr. Deville's visit to the convict ship England, bound with 148 prisoners for New South Wales. This zealous practitioner, after examining the convicts, gave a memorandum of the inferred character of each individual, and of the manner in which the propensities of each were likely to manifest themselves. The most desperate were accurately pointed out, and one man in particular, Robert Hughes, was noted as most dangerous on account of his ferocity and dissimulation. A mutiny, at the head of which was Hughes, was on the point of breaking out, and the conduct of every prisoner coincided most accurately with Mr. Deville's predictions. The records of the whole transaction are now officially in the victualling office, and the following is extracted from a letter of Mr. Thomson, surgeon to the ship, to whose care the convicts were committed.

'I have to thank you for your introduction to Deville and phrenology. Deville is right in every case but one, Thomas Jones, but this man can neither read nor write; and, being a sailor, he was induced to join the conspiracy to rise and seize the ship and carry her to South America, being informed by Hughes that he would then get his liberty. Observe how Deville has hit the real character of Hughes, and I will be grateful to Deville all my life, for his report enabled me to shut up in close custody the malcontents, and arrive here not a head minus, which, without the report, it is more than probable I could not have done. All the authorities here are become phrenologists.'

'Now,' continues our reviewer, 'the man who does not admit that to be a science which only errs but once in 148 cases, must have little experience of what human science is.'

And thus stands the pro and con of fact, with the comments on either side, as far as our pages can afford space to follow them. The contradiction you constantly hear in the narration of private circumstances is also conspicuous. The writer not long since heard a violent enemy to the cranioscopical scheme—a man of celebrity in literature—state that Dr. Gall, in taking a gauge of his cranium, discovered the manifestation of almost the only two dispositions he was conscious of being entirely destitute of, namely, the love of order, and the love of music. We lately heard that an individual, whose propensities have been proverbially amative, was declared by Mr. Deville to be without the organ of amativeness; and, in turning over the pages of a Trea-

tise on Insanity, which has been sent to us, while writing this article, from our friend Dr. Burrows, we find the following note.

'When Dr. Gall was in this country he went, in company with Dr. H. to visit the study of the eminent sculptor Chantrey. Mr. C. being at the moment engaged, they amused themselves in viewing the various efforts of his skill. Dr. Gall was requested to say, from the organs exhibited in a certain bust, what was the predominant propensity or faculty of the individual. He pronounced the original must be a great poet. His attention was directed to a second bust; he declared the latter to be a great mathematician. The first was the bust of Troughton, the eminent mathematician; and the second that of Sir Walter Scott!'

Coincidences have indeed, in our own observation, been confessedly much more common than seeming exceptions to the rules of judging, and the phrenologist would say that the cranioscopists might err, or that the totality of the development in the instances of apparent error had not been sufficiently taken into the account. Notable examples, too, have been given of the well known principle that men say and think sometimes with regard even to supposed facts, without being themselves always quite conscious of it, greatly according to their desires and presentiments, and no one can expect to come to a satisfactory conclusion without judging, observing, and feeling for himself. There is one difficulty which always appeared to the writer to be great in reference to the full reception of the craniological creed, and, if he recollects right, he stated it in his former article on the subject. But Dr. Spurzheim and Mr. Deville assure him the objection is without validity. It is this, that suppose an individual from accident, or any other cause, were to alter the whole course of his feelings, and change thoroughly the modes in which he exercised his intellect, ought not the manifestation of such moral and mental revolution to be evinced by the form of his cranium, or would not cranioscopy, in respect to this person, be necessarily and woefully defective? We have since, we say, been told, and we have had skulls measured before us, or rather casts of skulls, proving that the alteration in habit and study comes at length to bring with it an actual change of cerebral form, as displayed by the exterior. Casts of crania have been taken of the same individuals under these different circumstances of time and pursuit, and the shape has come to vary with these varying circumstances.

Upon the whole, then, the writer of this paper is compelled, and the reader may if he pleases suppose reluctantly, to confess, to a certain extent, his conversion to phrenological doctrine. Our belief, however, we care not to avow, has a little of the Abernethyan cast about it; we think that the cranioscopical 'mode of judging of one another to be unjust, and likely to be frequently productive of erroneous and injurious conclusions.' In this feeling we may indeed be somewhat borne out by those phrenologists themselves who are the most legitimate and scientific; for they complain that they are much misunderstood by those who talk of this man having the order of murder, and that of amativeness, in the way that they would talk of the color of his horse being bay or brown.

Let us further be permitted to say, that in spite of our concessions as to the unity and indivisibility of faculty, we must with the candid and acute individual just mentioned suppose a something in the manifestation of mind, and in the workings of moral feeling, beside perception in the organs themselves; or rather we must suppose a general perception, or a general something, giving direction, and excitation, and union, to the organic masses, each of which, under some such governing principles, acts, and is manifested, according to its own peculiarities. How all this takes place we do not pretend for one moment to divine, nor do we think it easy to say how much of cause and how much of consequence there is in the power assumed; but without a cerebral base for the organs to rest upon, or rather without a connecting link of the whole frame under which their several and specific functions are subordinated, sanity could in no instance be predicated of any individual; but the world would indeed be one vast Bicetre for the wanderings and visions of maniacs!

We recollect while pursuing our antiphrenological argument to have stated that the organists are in some sort wrong by assuming that an individual gets relief after being fatigued with one species of study, by changing it for another, giving thus a proof of separate organs being called into play exclusively when the mind is applied to one particular object. It was there said that on this principle the transition of one language to another could not afford that relief which experience proves it does; but that the student would bring with him the same jaded attention to the new as he had given to the former language. No, there is something general and leading beside particular and subordinate, and organology would appear to be wrong if it refuses to recognise that something.

We think it right just to state that the point is very nice in regard to practical judgment and conduct, founded on early manifestation of cerebral development. Education is both morally and intellectually exceedingly powerful in breaking down the strong holds of constitutional tendencies to vice and idleness; and, where the bias by nature is bad, there it behoves the guardian of destiny, in the instance of any individual, to be particularly alert; but let us not think too presumptively or largely of the power we possess in the counteraction now implied; and let us, while we are urging on one faculty or propensity, or repressing another, be careful that we do not give unnecessary pain to a sensitive mind on the one side, by constantly reminding him of talent of which he is deficient, and drawing from the example of partial dulness the inference that the whole character is dull. Then, again, let us be careful on the other hand, against yielding to organic manifestations; for some degree of power exists even in the least developed of the organs, and the phrenologists, as we have seen, assume, and admit, the vast power of particular exercise in altering even constructive peculiarities.

One great good of the principles, as it ap-

pears to our conception, is that of making us judge more charitably, and therefore more fairly, respecting the vices and deficiencies of those with whom we associate. We are too apt to make our own condition the measure by which we judge of others, not taking into account the maxim of the Great Teacher, to 'pluck out first the mote which is in our own eye, and then we shall see correctly that which is in our brother's.' This feeling and false conception of character and disposition extends itself mischievously even into minute concerns. The writer while riding, for instance, through beautiful scenery, or called to admire the magnificence of architectural structure, or engaged with interest in the observation of human character, has often been irritated almost to anger at the want of coincidence of feeling which he has found expressed with reference to the same circumstances and objects by those who are nearest and dearest to him, and he candidly avows that, since he has been more in the practice of employing the phrenological medium through which to view things, he has been less disposed either to wonder at, or be irritated by, want of unison in those tastes and perceptions which he was formerly too much in the practice of considering in manifestation or absence, as implying the manifestation or absence of sentiment and feeling generally.

We did not, it will be said, require a phrenological messenger from heaven to tell us that diversity of character exists and is displayed by diversity of persons; this was before sufficiently evident to every one who had the power of observing—true; but there is a wide difference between the reception of a truth as a general principle, and that truth being forced upon the attention by mediate and positive evidence; besides, we do not know whether the mode in which the phrenologists explain character does not more directly and demonstratively, and ad rem, apply to the purpose of excuse and palliation; but we should be fearful of stretching the argument too far in this direction, lest we give room for the adversaries of the doctrine to reiterate their charge of fate and necessity. We hold, and whether we are phrenologists or not in this holding let others say, that no organic tendencies could palliate the crime for which Thurtell died; and we further hold that all the ship's crew recently examined by Deville were culpable in yielding to vicious propensities, and might have been made, for the most part, good members of society by a due inculcation of correct principles, and a steady determination to resist the force of habit and example. But after a certain time, and after yielding to bad feelings to a certain extent, the awful sentence comes out, with dreadful application to individual cases, 'He that is filthy let him be filthy still.'

As it regards the anatomical, and physiological, and metaphysical pretensions to novelty and correctness which the framers of the phrenological creed put forth, we are neither among those who either think every thing has been done by Gall and Spurzheim, or those on the other side who maintain that their pretensions are totally without foundation. A celebrated physiologist on the continent is said to have avowed that 'he found nothing in the system new that was true, and nothing true that was new;' but it appears to us that the very anxiety evinced by its opposers to prove that the fibrous condition of the brain, and the best mode of unravelling and displaying its several parts, had been anticipated by others, is proof that the plan itself is based on correctness; at the same time we think both Gall and Spurzheim may have erred in assuming discovery and novelty too largely, and in talking rather too contemptuously of their contemporaries and predecessors. On the metaphysico-physiological creed of these men we have already had occasion to express our sentiments in several parts of the present discussion, and many of our readers will think we go to a sufficient length, although we might a little stop short of the sweeping eulogium of Dr. Elliotson, that no metaphysics are worth a moment's attention excepting what are found in the works of Dr. Gall and Dr. Thomas Brown.

We cannot, by the way, but regard those allegations as false and idle which charge the phrenologists with plagiary. The intimations which are found in the writings, whether ancient or modern, respecting locality of faculty, are of the most vague and unmeaning kind; and it is of importance to recollect that the suggestions which passed first across the conception of Dr. Gall did so at the time almost of his infancy. The curious, however, may feel a gratification in seeing some Italian lines pointing out three divisions of the brain, which are to be met with in the Tuboretto of Brunetto Latini, the preceptor of Dante; but, if this is an anticipation of phrenology, then Servetus certainly was robbed of the credit due to him by our countryman Hervey, and the doctrine of gravitation was taught in the mythological reveries of the ancient Hindostan priesthood.

Vel capo son *tre* celle
Ed io dirò di quelle
Davanti è lo intelleto
E la forza d'apprendere
Quello che puote intendiæ.
In *mezzo* è la ragione
E la discuzione
Che scherne buono e male.
E lo terno è l'iguale
Dirietro sta congloria
La valente memoria
Che ricorda e retiené
Quello ch' in essa viene.

Phrenological physiology, it may be finally said, such as it is, is obnoxious to no condemnatory comment on the score of cruelty. On this head our sentiments are likewise pertinaciously and provokingly intermediate. We feel no disposition to join in the chorus of those who indiscriminately cry shame at hearing of any thing like experiments on animals, who shudder with horror at the idea of becoming 'learned in physiology at the expense of humanity,' and, while they dwell with *gout* upon the delicacies of game, and talk with delight on the tenderness of a hunted hare, oppose their feelings and their virtues to all examinations on points of physiology which imply the infliction of a moment's pain on the inferior animals; but

we must consider that some of these trials have been of rather too wanton a nature, and that torture and immolation have too frequently been resorted to for proving what is insusceptible of proof in this way, and, if proved, of little avail.

Cordially therefore do we join in the sentiments and statements contained in the following paragraph from our much admired, and so much quoted, reviewer, and with this extract do we at once take leave both of him and our readers.

'One claim at least is to be made in favor of our science, and this distinguishes it from all the branches of physiology which have been cultivated to this day; it has cost no blood: not a single act of cruelty has dishonored it. While Messrs. Magendie, Flourens, and others, have been torturing animals to teach their pupils but little, and repeating their tortures to learn that little over and over again, our masters have not mutilated a single insect while alive, or shortened the existence of a single being, to have its brains a few days sooner under their scalpel. Yet phrenologists might feel as much interest in scraping away a piece of cautiousness, and then observing how dauntless the animal would become; or of excavating an organ of locality, to make him lose his way, as any physiological butcher could do; or they might be as curious as Vesalius was, to take a peep into the living organs of some human subject. But they have abstained from every act of cruelty, and shown that anatomy and physiology may receive some of its best additions without becoming inhuman.'

PHREN'SY, *n. s.* } Fr. *phrenesie ;* Gr.
PHRENET'IC, *adj.* & *n. s.* } φρενιτις. Madness; franticness: often written frenzy. See FRENZY. Phrenetic is mad; frantic: as a noun substantive a mad person.

Many never think on God, but in extremity of fear, and then, perplexity not suffering them to be idle, they think and do as it were in a *phrensy*. *Hooker.*

Demoniack *phrensy*, moping melancholy.
Milton.

Would they only please themselves in the delusion, the *phrensy* were more innocent; but lunaticks will needs be kings. *Decay of Piety.*

I see so many kinds of *phrensies* in the world, and so many seemingly wise brains taken with them, that I much doubt whom I may be sure to account free, from either the touch, or at least the danger of this indisposition. *Bp. Hall.*

Phreneticks imagine they see that without, which their imagination is affected with within. *Harvey.*

What œstrum, what *phrenetic* mood,
Makes you thus lavish of your blood?
Hudibras.

The world was little better than a common fold of *phreniticks* and bedlams. *Woodward's Nat. Hist.*

Phrensy or inflammation of the brain, profuse hamorrhages from the nose resolve, and copious bleeding in the temporal arteries.
Arbuthnot on Aliments.

PHRICIUM, an ancient town near Thermopylæ. Livy, xxxvi. c. 13.

PHRONIMA, the daughter of Elearchus king of Crete, wife of Polymnestus, and mother of Battus, the founder of Cyrene.

PHRYGANEA, a genus of insects having the following characters:—The mouth is without teeth, but furnished with four palpi: the stemmata are three in number; the antennæ are filiform, and longer than the thorax. The wings are incumbent; the under ones are folded. The genus has been divided into two sections; the first of which is characterised by having two truncated setæ at the extremity of the abdomen, resembling the beard of an ear of corn; while the second has the abdomen simple, or without appendices. The tarsi of the feet of the first family consist of three articulations; those of the second are composed of five. The wings of this section decline from the inner margin towards the sides, so as to resemble the ridge of a house, and are curved or turned upwards at their extremity. 'This insect,' says Barbut, 'before it becomes an inhabitant of the air, has lived under water, lodged in a kind of tube or sheath, the inward texture of which is silk; outwardly covered with sand, straws, bits of wood, shells, &c. When the hexapod worm is about to change to a chrysalis, he stops up the opening of his tube with threads of a loose texture, through which the water makes its way, but prevents the approach of voracious insects. The crysalis is covered with a thin gauze, through which the new form of the insect is easily discerned. The phryganea, on the point of changing its element, rises to the surface of the water, leaves its tube, rises into the air, and enjoys the sweets of the country, flutters upon flowers and trees, but is soon called away to the water-side to deposit its eggs: whence proceed its posterity. These aquatic larvæ are often found in stagnating waters, where they wrap themselves up in the water-lentil, cut out into regular squares, and fitted one to another. Trouts are very greedy of these larvæ, which is the reason that in some countries, after stripping them of their coats, they make use of them for fishing-baits.' There are various different species of the phryganea; but, except the phryganea bicauda and striata, they do not materially differ from one another, except in size and color.

1. P. bicauda is of a deep dark brown color, having a single yellow longitudinal band running across the head and thorax. The legs are of a brown color, as are the antennæ; which are also long and filiform. Two brown threads, almost as long as the antennæ, terminate the abdomen; whence the name bicauda, or two-tailed. The wings, which are about a third longer than the body, are veined with brown fibres, are narrow at the top, broad below, and are as it were stuck upon the body, which they infold, crossing one over the other. This insect, which is met with on the bank of rivers and standing waters, carries its eggs in a cluster at its abdomen, like some spiders.

2. P. striata is a large species, of a dun color except the eyes, which are black, and has a considerable resemblance to the phalæna in the carriage of its wings. The antennæ are as long as

the body, and are borne straight forward. The wings are a third larger than the body, having veins of a color rather deeper than the rest. The feet are large, long, and somewhat finny. Mr. Yeats tells us that the perlæ of Geoffroy, and phryganeæ of Linnæus, do not differ generically. It appears, however, from Yeats's experiments, that the phryganeæ remain longer in the chrysalis than the perlæ.

Phryganeæ, the Lesser, very much resemble the tineæ; but, upon examining them with a glass, the former will be found to be covered with small hairs instead of the scales which adorn the wings of the latter.

PHRYGES, a river in Asia Minor, dividing Phrygia from Caria, and falling into the Hermus. —Paus.

PHRYGIA, a country of Asia. Whence it derived its name is not certain; some say it was from the river Phryx (now Sarabat), which divides Phrygia from Caria, and falls into the Hermus; others from Phrygia, the daughter of Asopus and Europa. The Greek writers tell us that the country took its name from the inhabitants, and these from the town of Brygium in Macedonia, whence they first passed into Asia, and gave the name of Phrygia or Brygia to the country where they settled. Bochart is of opinion that this tract was called Phrygia from the Greek verb φρυγειν, to burn or parch; which, according to him, is a translation of its Hebrew name, derived from a verb of the same signification. No less various are the opinions of authors as to the exact boundaries of this country; an uncertainty which gave rise to an observation made by Strabo; viz. that the Phrygians and Mysians had distinct boundaries, but that it was scarcely possible to ascertain them. The same writer adds that the Trojans, Mysians, and Lydians, are, by the poets, all blended under the common name of Phrygians, which Claudian extends to the Pisidians, Bithynians, and Ionians.

Phrygia Major, and indeed all Asia Minor, as lying in the fifth and sixth northern climates, was, in ancient times, greatly celebrated for its fertility. It abounded in all sorts of grain; being for the most part a plain country covered with a deep rich soil, and plentifully watered by small rivers. It was in some parts productive of bitumen and other combustible substances. It was well stocked with cattle, having large plains and pasture grounds. The air was anciently deemed most pure and wholesome, though it is now in some parts thought extremely gross, great part of the country lying uncultivated. In Phrygia Major were anciently several cities of great celebrity, such as Apamea, Laodicea, Hierapolis, Gordium, &c. There were also some famous rivers, such as Marsyas, Mæander, &c., now called Madre or Mindre. See Mæander. The Phrygians accounted themselves the most ancient people in the world. Their origin, however, is extremely dark and uncertain. Josephus and St. Jerome say that they were descended from Togarmah, one of Gomer's sons; and that they were known to the Hebrews under the name of Tigrammanes. The heathen authors derive them from the Brygians, a people of Macedonia. But this is a conjecture totally unsupported, except by the similarity of names. Bochart thinks that the Phrygians were the offspring of Gomer, the eldest son of Japhet; the word Phrygia being the Greek translation of his name. Josephus makes Gomer the father of the Galatians; but he, by the Galatians, must necessarily mean the Phrygians inhabiting that part of Phrygia which the Galatians had made themselves masters of; the descendants of Gomer being placed by Ezekiel northward of Judea, near Togarmah (which Bochart takes to be Cappadocia) long before the Gauls passed over into Asia. The ancient Phrygians are described as superstitious, voluptuous, and effeminate, without any prudence or forecast, and of such a servile temper that nothing but stripes and ill-usage could make them comply with their duty; which gave rise to several trite and well known proverbs. They are said to have been the first inventors of divination by the singing, flying, and feeding of birds. Their music, commonly called the Phrygian mode, is alleged by some as an argument of their effeminacy. Their government was monarchical; and all Phrygia was, during the reigns of some kings, subject to one prince. Ninnacus, Midas, Manis, Gordius, and his descendants, were undoubtedly sovereigns of all Phrygia. But, some time before the Trojan war, this country was divided into several petty kingdoms, and we read of divers princes reigning at the same time. Apollodorus mentions a king of Phrygia contemporary with Ilus, king of Troy. Cedrenus and others speak of one Teuthras, king of a small country in Phrygia, whose territories were ravaged by Ajax, himself slain in single combat, his royal seat laid in ashes, and his daughter, Tecmessa, carried away captive by the conqueror. Homer mentions Phorcys and Ascanius, both princes and leaders of the Phrygian auxiliaries that came to the relief of Troy. Tantalus was king of Sipylus only, and its district: a prince no less famous for his great wealth than infamous for his covetousness and other detestable vices. That Phrygia was subdued either by Ninus, as Diodorus Siculus informs us, or by the Amazons, as we read in Suidas, is not sufficiently warranted. Most authors who mention Gordius tell us that the Phrygians, having sent to consult an oracle, to know how they might put an end to the intestine broils which rent their country into many factions and parties, received for answer that the most effectual means to deliver themselves and their country from the calamities they groaned under was to commit the government to a king. This advice they followed, and placed Gordius on the throne. As to their commerce, all we know is, that Apamea was the chief emporium of all Asia Minor. Thither resorted merchants and traders from all parts of Greece, Italy, and the neighbouring islands. Syncellus says that the Phrygians were for some time masters of the sea; and none but trading nations ever prevailed on that element. The country produced many choice and useful commodities, which afforded considerable exports. They had a safe coast, and convenient harbours. The Phrygian idols were very numerous. The chief of these was Cybele, who went by a variety of

names. They also worshipped Bacchus under the name of Sabazios; and his priests they called Sabbi. The history of their kings is uncertain, and the dates of their several reigns and actions cannot now be fixed; we shall refer such of our readers, therefore, as wish to know what is certain respecting them to the Ancient Universal History, already quoted more than once in the present article. See also GORDIUS, MIDAS, &c.

PHRYGIA MINOR. See TROY.

PHRYGIA PROPER, according to Ptolemy, was bounded on the north by Pontus and Bithynia; on the west by Mysia, Troas, the Ægean Sea, Lydia, Mæonia, and Caria; on the south by Lycia; on the east by Pamphylia and Galatia. It lies between 37° and 41° N. lat., extending in long. from 57° to 62°. The inhabitants of this country, mentioned by Ptolemy, are the Lycaones and Anthemisenii, towards Lycia; and Moccadelis or Moccadine, the Cydesses or Cydisses towards Bithynia; and between these the Peltini or Speltini, the Moxiani, Phylacenses, and Hierapolitæ. To these we may add the Berecyntes mentioned by Strabo. Phrygia is commonly divided into the Greater and Lesser Phrygia, called also Troas. But this division did not take place till Troas was subdued by the Phrygians; and hence it is more considered by some Roman writers as a part of Phrygia than Bithynia, Cappadocia, or any other of the adjacent provinces. In after ages the Greater Phrygia was divided into two districts or governments, called, 1. Phrygia Pacatiana, from Pacatianus, who, under Constantine, bore the great office of the præfectus prætorio of the east; and 2. Phrygia Salutaris, from some miraculous cures supposed to have been performed there by the archangel Michael.

PHRYGIAN STONE, in natural history, is the name of a stone described by the ancients, and used by them in dyeing; perhaps from some vitriolic or aluminous salt contained in it, which served to enliven or fix the colors used by the dyers. It was light and spongy, resembling a pumice; and the whitest and lightest were reckoned the best. Pliny gives an account of the method of preparing it for the purpose of dyeing, which was by moistening it with urine, and then heating it red hot, and suffering it to cool. This calcination was repeated three times, and the stone was then fit for use. Dioscorides recommends it in medicine after burning; he says it was drying and astringent.

PHRYMA, in botany, a genus of the gymnospermia order, and didynamia class of plants; in the natural method, ranking in the sixtieth order, personatæ.

PHRYNE, a courtezan of Athens who flourished about A. A. C. 328. She was mistress of Praxiteles, who drew her picture, which was one of his best pieces, and was placed in the temple of Apollo at Delphi. Phryne became so very rich, by the liberality of her lovers, that she offered to rebuild Thebes at her own expense, which Alexander had destroyed, provided this inscription was placed on the walls, Alexander diruit, sed meretrix Phryne refecit; which was refused. See Plin. xxxiv. c. 8.

PHRINICUS. 1. A general of Samos, who endeavoured to betray his country: 2. A flatterer at Athens: 3. A tragic poet of Athens, disciple to Thespis. He was the first who introduced a female character on the stage.

PHRYNIS. 1. A musician of Mitylene. He was the first who obtained a musical prize at the Panathenæa at Athens. He added two strings to the lyre, which had always been used with seven by all his predecessors. He flourished about A. A. C. 438, and was originally a cook at the house of Hiero king of Sicily: 2. A writer in the reign of Commodus, who made a collection, in thirty-six books, of phrases and sentences from the best Greek authors, &c.

PHRYNO, a celebrated general of Athens, who flourished about A. A. C. 590.

PHRYXUS, in fabulous history, a son of Athamus, king of Thebes, by Nephele. When his mother was repudiated, he was persecuted with the most inveterate fury by his step-mother Ino, because he was to sit on the throne of Athamas, in preference to her children. His mother apprized him of Ino's intentions upon his life; or, according to others, his preceptor; and, the better to make his escape, he secured part of his father's treasures, and privately left Bœotia with his sister Helle, to go to their relation Æetes, king of Colchis. They embarked on board a ship, or, as we are informed by the poets and mythologists, they mounted on the back of a ram, whose fleece was of gold, and proceeded on their journey through the air. The height to which they were carried made Helle giddy, and she fell into the sea. Phryxus gave his sister a decent burial on the sea-shore, and after he had called the place Hellespont, from her name, he continued his flight, and arrived safely in the kingdom of Æetes, where he offered the ram on the altar of Mars. The king received him kindly, and gave him Chalciope his daughter in marriage. She had by him Phrontis, Melas, Argos, and Cylindrus, whom some call Cytorus. He was afterwards murdered by his father-in-law, who envied him the possession of the golden fleece; and Chalciope, to prevent her children from sharing their father's fate, sent them privately from Colchis to Bœotia, as Ino was then dead. The fable of the flight of Phryxus to Colchis on a ram has been explained by some, that the ship on which he embarked was either called by that name, or carried on her prow a figure of that animal. The fleece of gold is accounted for by observing, that Phryxus carried away immense treasures from Thebes. Phryxus was placed among the constellations of heaven after death. The ram which carried him to Asia is said to have been the fruit of Neptune's amour with Theophane the daughter of Atlas. This ram the gods had given to Athamas to reward his piety and religious life: and Nephele procured it for her children, just as they were going to be sacrificed to the jealousy of Ino. Phryxus's murder was some time after amply revenged by the Greeks; it having occasioned the famous expedition achieved under Jason and many of the princes of Greece, which had for its object the recovery of the golden fleece, and the punishment of the king of Colchis for his cruelty to the son of Athamas.

PHTHIA, an ancient town of Thessaly, in Phthiotis, east of Mount Othrys, famous for being the birth-place of Achilles, hence called Pthius heros.

PHTHIOTIS, in ancient geography, a province of Thessaly, between the Sinus Pelasgicus and Sinus Maliacus, Magnesia, and Mount Oeta; also called Achaia. Paus. x. c. 8.

PHTHIRIASIS (Gr. φθειρ, the louse), or morbus pediculosus, a disease in which several parts of the body generate lice, which often puncture the skin, and produce little sordid ulcers. There are two principal species of lice which infest the human body, i. e. the pediculus humanus, and the morpiones or crab lice. Respecting that variety of the former which we call body-lice Linnæus observes, 'varietas capitis durior, coloratior, vestimentorum laxior, magis cinerea.' They breed abundantly among the inhabitants of sordid dwellings, chiefly workhouses, gaols, &c., and in such situations prey upon persons of all ages. There is also a peculiar state of skin in people advanced in years, and connected with the disease, which has been denominated prurigo senilis by Dr. Willan, in which they are generated, and multiply rapidly notwithstanding every attention to cleanliness or regimen. The nits or eggs are deposited on the small hairs of the skin; and the pediculi are found on the skin or linen. Many marvellous stories are related by Forestus, Schenckius, and others, respecting lice bred under the skin, and discharged in swarms from abscesses, strumous ulcers, and vesications, and many individuals of great note are stated to have died in consequence in ancient times. Plutarch relates of Sylla: 'It was long before he perceived that he had an ulcer within his body; but at last the flesh putrefied, and produced such a quantity of lice, that, though many persons were employed day and night in destroying them, yet they increased much faster than they could be removed; and to such a degree did the distemper prevail, that his clothes, baths, basins, and food, were polluted with that perpetual flux of corruption and vermin. He went many times in the day into the water, to scour and cleanse his body, but all in vain; the vermin multiplied so fast as to baffle every attempt to destroy them.' Our biographer adds, 'it is said that, among the ancients, there died of this disease Acastus the son of Pelias, and nearer our own times Alcmæon the poet, Pherecydes the philosopher, Callisthenes the Olynthian, during the time of his imprisonment, and Mutius the lawyer: and, if it be proper to add to these a person not distinguished by any merit or virtue, Eunus, a fugitive slave, who was author of the war in Sicily, called the 'servile war,' and who was taken and carried prisoner to Rome, died likwise of this sickness.' Herod, Ennius, and by some Plato is said also to have been destroyed by lice. In more recent times, Amatus Lusitanus states that he was witness to the case of a gentleman, who perished in this way; 'so universally did these insects swarm over his body, that two negro servants were entirely employed in collecting baskets full from his person, and carrying them to the sea.'

It appears probable that in the ancient accounts cases of ulceration which afforded a nidus for the breeding of maggots or flies have been mistaken for instances of the morbus pedicularis. In warm climates, flies are so numerous about the persons of the sick, that the utmost care is requisite to prevent the generation of larvæ from the eggs which they deposit, not only in superficial wounds, but in the nostrils, mouth, gums, and even in the brain. Even the black beetle (senebrio molipor) has been known to breed in the body in this way. But the generation of lice, in connexion with the prurigo of elderly people, is frequently a very troublesome malady in modern times; and the destruction of them is commonly a mere alleviation; since their reproduction is so very rapid. A decoction of the seeds of stavesacre, or of the cocculus indicus, or the powder of either of these substances, alone or mixed with lard in the form of an ointment, are effectual destroyers of the pediculi of the head, and even of the body-lice, as are the mercurial ointments, such as that of the white precipitated oxide. The morpiones, or crab-lice, which fix themselves firmly in the skin, about the pubes, axillæ, and in fact on every part of the trunk and extremities where there is hair, are completely destroyed either by inunction with the common blue mercurial ointment, or spike-oil, i. e. the essential oil of lavender mixed with oil of turpentine. A solution of the corrosive muriate of mercury in spirit is also often efficacious in the pedicular prurigo of the body, and tends to remove the pruriginous affection, which seems to give rise to the tendency to generate lice. But none of these pungent substances can be applied, except when the skin is unbroken.

PHTHI'SIC, *n. s.*
PHTHISICAL, *adj.*
PHTHISIS, *n. s.*
Fr. *phthisic*; Gr. φθισις. Consumption. This is the sense of both nouns: phthisical is wasting; pining.

A collection of purulent matter in the capacity of the breast, if not suddenly cured, doth undoubtedly impel the patient into a *phthisical* consumption.
Harvey on Consumptions.

His disease was a *phthisick* or asthma, oft incurring to an orthopnea. *Id.*

If the lungs be wounded deep, though they escape the first nine days, yet they terminate in a *phthisis* or fistula. *Wiseman.*

We next inquire, but softly and by stealth,
Like conservators of the public health,
Of epidemic throats, if such there are,
And coughs, and rheums, and *phthisic*, and catarrh
Cowper.

PHTHISIS is a species of consumption, occasioned by an ulcer in the lungs. See MEDICINE, Index. Dr. Beddoes suggested a new theory of phthisis, founded on the pneumatic doctrine. He fixed on the effect of pregnancy in suspending the progress of phthisis as a fact which, by its mode of operation, might suggest a method of diminishing the havoc occasioned by this distemper. 'The fœtus, says he, has its blood oxygenated by the blood of the mother through the placenta. During pregnancy there seems to be no provision for the reception of an unusual quantity of oxygen. On the contrary, in consequence of the impeded action of the diaphragm, less and less should be continually

taken in by the lungs. If, therefore, a somewhat diminished proportion of oxygen be the effect of pregnancy, may not this be the way in which it arrests the progress of phthisis? and, if so, is there not an excess of oxygen in the system of consumptive persons? and may we not, by pursuing this idea, discover a cure for this fatal disorder?' Dr. Beddoes thinks that this supposition is also countenanced by the deficiency of oxygen in the blood of asthmatic patients, and of those who labor under sea-scurvy; and by the super-abundance of it in the blood of phthisical persons, indicated by its color, by the aggravation of the symptoms of consumption by breathing oxygen, and by the relief from inspiring atmospheric air mixed with carbonic acid gas; and, lastly, from the small proportion of deaths among sea-faring people. From these facts Dr. Beddoes concludes, that '1. The phthisical inflammation may so alter the structure of the lungs as to cause them to transmit a more than ordinary portion of oxygen to the blood; or, 2. Some unknown cause having enabled them to transmit, or the blood itself to attract, more oxygen, an inflammation of the lungs might ensue.' Our author, in a letter to Dr. Darwin, gives an account of his treating with success several cases of phthisis according to the principles of this theory.

Dr. Hooper thus enumerates the species of this important disorder:—

1. Phthisis incipiens, incipient without an expectoration of pus.
2. Phthisis humida, with an expectoration of pus.
3. Phthisis scrophulosa, from scrofulous tubercles in the lungs, &c.
4. Phthisis hæmoptoica, from hæmoptysis.
5. Phthisis exanthematica, from exanthemata.
6. Phthisis chlorotica, from chlorosis.
7. Phthisis syphilitica, from a venereal ulcer in the lungs.

The causes which predispose to this disease, says this last writer, are very numerous. The following are, however, the most general: hereditary disposition; particular formation of body, obvious by a long neck, prominent shoulders, and narrow chest; scrofulous diathesis, indicated by a fine clear skin, fair hair, delicate rosy complexion, large veins, thick upper lip, a weak voice, and great sensibility; certain diseases, such as syphilis, scrofula, the small-pox, and measles; particular employments exposing artificers to dust, such as needle-pointers, stone-cutters, millers, &c., or to the fumes of metals or minerals under a confined and unwholesome air; violent passions, exertions, or affections of the mind, as grief, disappointment, anxiety, or close application to study, without using proper exercise; frequent and excessive debaucheries, late watching, and drinking freely of strong liquors: great evacuations, as diarrhœa, diabetes; excessive venery; fluor albus; immoderate discharge of the menstrual flux, and the continuing to suckle too long under a debilitated state; and, lastly, the application of cold, either by too sudden a change of apparel, keeping on wet clothes, lying in damp beds, or exposing the body too suddenly to cold air, when heated by exercise; in short, by any thing that gives a considerable check to the perspiration. The more immediate or occasional causes of phthisis are, hæmoptysis, pneumonic inflammation proceeding to suppuration, catarrh, asthma, and tubercles, the last of which is by far the most general.

'The incipient symptoms usually vary with the cause of the disease; but, when it arises from tubercles, it is usually thus marked: it begins with a short dry cough, that at length becomes habitual, but from which nothing is spit up for some time, except a frothy mucus that seems to proceed from the fauces. The breathing is at the same time somewhat impeded, and upon the least bodily motion is much hurried: a sense of straitness, with oppression at the chest, is experienced: the body becomes gradually leaner, and great languor, with indolence, dejection of spirits, and loss of appetite, prevail. In this state the patient frequently continues a considerable length of time, during which he is, however, more readily affected than usual by slight colds, and upon one or other of these occasions the cough becomes more troublesome and severe, particularly by night, and it is at length attended with an expectoration, which towards morning is more free and copious. By degrees the matter which is expectorated becomes more viscid and opaque, and now assumes a greenish color and purulent appearance, being on many occasions streaked with blood. In some cases, a more severe degree of hæmoptysis attends, and the patient spits up a considerable quantity of florid, frothy blood. The breathing at length becomes more difficult, and the emaciation and weakness go on increasing. With these, the person begins to be sensible of pain in some part of the thorax, which, however, is usually felt at first under the sternum, particularly on coughing. At a more advanced period of the disease a pain is sometimes felt on one side, and at times prevails in so high a degree as to prevent the person from lying easily on that side; but it more frequently happens that it is felt only on making a full inspiration, or coughing. Even where no pain is felt, it often happens that those who labor under phthisis cannot lie easily on one or other of their sides, without a fit of coughing being excited, or the difficulty of breathing being much increased. At the commencement of the disease, the pulse is often natural, or perhaps is soft, small, and a little quicker than usual; but, when the symptoms which have been enumerated have subsisted for any length of time, it then becomes full, hard, and frequent. At the same time the face flushes, particularly after eating, the palms of the hands and soles of the feet are affected with burning heat; the respiration is difficult and laborious; evening exacerbations become obvious, and, by degrees, the fever assumes the hectic form. This species of fever is evidently of the remittent kind, and has exacerbations twice every day. The first occurs usually about noon, and a slight remission ensues about five in the afternoon. This last is, however, soon succeeded by another exacerbation, which increases gradually until after midnight; but about two o'clock in the morning a

remission takes place, and this becomes more apparent as the morning advances. During the exacerbations the patient is very sensible to any coolness of the air, and often complains of a sense of cold when his skin is, at the same time, preternaturally warm. Of these exacerbations, that of the evening is by far the most considerable. From the first appearance of the hectic symptoms, the urine is high colored, and deposites a copious branny red sediment. The appetite, however, is not greatly impaired, the tongue appears clean, the mouth is usually moist, and the thirst is inconsiderable. As the disease advances, the fauces put on rather an inflamed appearance, and are beset with aphthæ, and the red vessels of the tunica adnata become of a pearly white. During the exacerbations, a florid circumscribed redness appears on each cheek; but at other times the face is pale, and the countenance somewhat dejected. At the commencement of hectic fever, the belly is usually costive; but, in the more advanced stages of it, a diarrhœa often comes on, and this continues to recur frequently during the remainder of the disease; colliquative sweats likewise break out, and these alternate with each other, and induce vast debility. In the last stage of the disease the emaciation is so great that the patient has the appearance of a walking skeleton; his countenance is altered, his cheeks are prominent, his eyes look hollow and languid, his hair falls off, his nails are of a livid color, and much incurvated, and his feet are affected with œdematous swellings. To the end of the disease the senses remain entire, and the mind is confident and full of hope. It is, indeed, a happy circumstance attendant on phthisis, that those who labor under it are seldom apprehensive or aware of any danger; and it is no uncommon occurrence to meet with persons laboring under its most advanced stage, flattering themselves with a speedy recovery, and forming distant projects under that vain hope. Some days before death the extremities become cold. In some cases a delirium precedes that event, and continues until life is extinguished.

'As an expectoration of mucus from the lungs may possibly be mistaken for purulent matter, and may thereby give us reason to suspect that the patient labors under a confirmed phthisis, it may not be amiss to point out a sure criterion, by which we shall always be able to distinguish the one from the other. The medical world are indebted to the late Mr. Charles Darwin for the discovery, who has directed the experiment to be made in the following mannr:—Let the expectorated matter be dissolved in vitriolic acid, and in caustic lixivium, and add pure water to both solutions. If there is a fair precipitation in each, it is a certain sign of the presence of pus; but, if there is not a precipitate in either, it is certainly mucus.'

Sir Everard Home, in his dissertation on the properties of pus, states a curious, but not decisive mode of distinguishing accurately between pus and animal mucus. The property, he observes, which characterises pus, and distinguishes it from most other substances, is, its being composed of globules, which are visible when viewed through a microscope; whereas animal mucus, and all chemical combinations of animal substances, appear in the microscope to be made up of flakes. This property was first noticed by the late Mr. John Hunter. See MEDICINE, Index.

PHUL, or PUL, king of Assyria, is by some historians said to be Ninus under another name, and the first founder of that monarchy: a renowned warrior. He invaded Israel in the reign of Menahem, who became tributary to him, and paid him 1000 talents of silver for a peace. A. A. C. 771.

PHUT, or PHUTH, the third son of Ham. Gen. x. 6. Calmet is of opinion that Phut peopled either the canton of Phtemphu, Phtemphuti, or Phtembuti, set down in Pliny and Ptolemy, whose capital was Tharia in Lower Egypt, inclining towards Libya; or the canton called Phtenotes, of which Buthus was the capital. The prophets often speak of Phut. In the time of Jeremiah, Phut was under the obedience of Necho, king of Egypt. Nahum (iii. 9) reckons up his people in the number of those who ought to have come to the assistance of No-ammon, or Diospolis.

PHYCUS (untis.) a promontory near Cyrene, now called Ras el Sem.—*Lucan.* ix.

PHYLACTERY, *n. s.* Fr. *phylactere*; Gr. φυλακτηριον. An ancient bandage on which was inscribed some memorable sentence.

Lest, when they had been abroad, they should have been touched by any, contrary to the warning of their *phylacteries*, they scoured themselves at their return. *Bp. Hall.*

The *philacteries* on their wrists and foreheads were looked on as spells, which would yield them impunity for their disobedience. *Hammond.*

Golden sayings,
On large *phylacteries* expressive writ,
Were to the foreheads of the Rabbins tied.
Prior.

PHYLACTERY, in general, was a name given by the ancients to all kinds of charms, spells, or characters, which they wore about them, as amulets, to preserve them from dangers or diseases.

PHYLACTERY also denoted a slip of parchment, whereon was written some text of Holy Scripture, particularly of the decalogue, which the devout people among the Jews wore on the forehead, the breast, or the neck, as a mark of their religion. The primitive Christians also gave the name phylacteries to the cases wherein they enclosed the relics of their dead. Phylacteries are often mentioned in the New Testament, and appear to have been very common among the Pharisees in our Lord's time.

PHYLACUS, the son of Deion, king of Phocis, and founder of Phylace in Thessaly. He married Clymene, the daughter of Mynias, by whom he had Iphiclus, the father of Protesilaus.

PHYLARCHUS, an ancient Grecian biographer, who flourished A. A. C. 220.

PHYLAS, an ancient town of Thessaly, built by Phylacus. Protesilaus reigned in it, hence called Phylacides. Lucan. vi. 252.

PHYLE, a well fortified village of Attica, near Athens. Cor. Nep.

PHYLICA, bastard alaternus; a genus of the monogynia order, and pentandria class of plants:

in the natural method ranking under the forty-third order, dumosæ. There are six species, of which three are kept in the gardens of this country; but, by reason of their being natives of warm climates, they require to be kept in pots, and housed in winter. They are all shrubby plants, rising from three to five feet high, and adorned with beautiful clusters of white flowers. They are propagated by cuttings.

PHYLLACHNE, in botany, a genus of the monandria order, and monœcia class of plants.

PHYLLALIA, 1. A district of Arcadia; 2. A town of Thessaly.

PHYLLANTHUS, in botany, sea-side laurel; a genus of the triandria order, and monœcia class of plants: in the natural method ranking in the thirty-eighth order, tricoccæ. There are six species, all natives of warm climates; and rise from twelve to fourteen feet to the height of middling trees. They are tender and cannot be propagated in this country without artificial heat.

PHYLLEIUS, a mountain and country of Macedonia. Apol. Arg.

PHYLLIS, in fabulous history, a daughter of Sithon, or, according to others, of Lycurgus, king of Thrace, who received Demophoon, the son of Theseus, who, at his return from the Trojan war, had stopped on her coasts. She became enamoured of him, and did not find him insensible to her passion. After some months of mutual tenderness and affection, Demophoon set sail for Athens, where his domestic affairs recalled him. He promised faithfully to return within a month; but either his dislike for Phyllis, or the irreparable situation of his affairs, obliged him to violate his engagement: and the queen, grown desperate on account of his absence, hanged herself, or, according to others, threw herself down a precipice into the sea and perished. Her friends raised a tomb over her body, where there grew up certain trees, whose leaves, at a particular season of the year, suddenly became wet, as if shedding tears for the death of Phyllis. According to an old tradition mentioned by Servius, Virgil's commentator, Phyllis was changed by the gods into an almond-tree, called phylla by the Greeks. Some days after this metamorphosis, Demophoon revisited Thrace; and, when he heard of the fate of Phyllis, he ran and clasped the tree, which, though at that time stripped of its leaves, suddenly shot forth, and blossomed, as if still sensible of tenderness and love. The absence of Demophoon from the house of Phyllis has given rise to a beautiful epistle of Ovid, supposed to have been written by the Thracian queen about the fourth month after her lover's departure.

Phyllis, in botany, bastard hare's-ear, a genus of the digynia order, and pentandria class of plants: in the natural method ranking under the forty-seventh order, stellatæ.

Phyllis, in geography, a country of Thrace, near Mount Pangæus.

PHYSALIS, the winter cherry, a genus of the monogynia order, and pentandria class of plants; in the natural method ranking under the twenty-eighth order, luridæ. There are sixteen species, of which the most remarkable is the

P. alkekengi, or common winter cherry. This grows naturally in Spain and Italy. The roots are perennial, and creep in the ground to a great distance if they are not confined. These, in the spring, shoot up many stalks, which rise to the height of a foot or more, garnished with leaves of various sorts, some of which are angular and obtuse, some oblong and sharp-pointed, with long foot-stalks. The flowers are produced from the wings, standing upon slender foot-stalks; are of a white color, and have but one petal. They are succeeded by round berries about the size of small cherries, enclosed in an inflated bladder, which turns red in autumn, when the top opens and discloses the red berry, which is soft, pulpy, and filled with flat kidney-shaped seeds. Soon after the fruit is ripe, the stalks decay to the root. The plant is easily propagated, either by seeds, or parting the roots.

PHYSALITE, or Pyrophysalite, in mineralogy, a sub-species of prismatic topaz. Color greenish-white. Massive. In granular concretions. Splendent in the cleavage, which is perfect, and as in topaz. Fracture uneven. Translucent on the edges. As hard as topaz. Specific gravity 3·451. It whitens with the blow-pipe. Its constituents are, alumina 57·74, silica 34·36, fluoric acid 7·77. It is found in granite at Finbo, in Sweden. Jameson.

PHYSALUS. See Scolopendra.

PHYSION, a cape or rock of Bœotia, famous for being the residence of the Sphynx.

PHYSCON, φυσκον, i. e. big-bellied. A nick-name of a tyrant of Egypt. See Egypt.

PHYSCONIA, Gr. φυσκων, a big-bellied fellow. Hyposarca; hypersarchidios. Enlargement of the abdomen. A genus of disease in the class cachexiæ, and order intumescentiæ, of Cullen; known by a tumor occupying chiefly one part of the abdomen, increasing slowly, and neither sonorous nor fluctuating. Species:—1. Hepatica; 2. Splenica; 3. Renalis; 4. Uterina; 5. Ab ovario; 6. Mesenterica; 7. Omentalis; 8. Visceralis.

PHYSCOS, a town of Caria, opposite Rhodes. Strabo, 14.

PHYSCUS, a river of Asia, running into the Tigris. Xenophon crossed it with his 10,000 Greeks, in their famous retreat from Cunaxa.

PHYSETER, the spermaceti fish, in zoology, a genus of mammalia, belonging to the order of cete. There are four species, according to Mr. Kerr:—

1. P. catodon, the round headed cachalot, with a fistula in the snout, and having no back fin. Of this species 102 of different sizes were cast ashore at one time on one of the Orkney Isles, the largest twenty-four feet in length. The head is round, the opening of the mouth small. Sibbald says it has no spout-hole, but only nostrils: but Mr. Pennant is of opinion that the former being placed at the extremity of the nose, has been mistaken by him for the latter. Some teeth of this species are an inch and a quarter long, and in the largest part of the thickness of one's thumb. The top is quite flat, and marked with concentric lines; the bottom is more slender than the top, and pierced with a small orifice: instead of a back fin, there was a rough space. For the method of extracting the spermaceti from the brain of these creatures, see Spermaceti.

2. P. macrocephalus, the blunt-nosed cachalot, the blunt-headed cachalot of Pennant, or spermaceti whale of Dudley, has no fin on the back; and the blowing-pipe is situated on the nape of the neck. Of this species Mr. Kerr enumerates three varieties, viz.:

i. P. macr. albicans, the white blunt-nosed cachalot, of a white color with a smooth back. This is about fifteen or sixteen feet long, and resembles the common whale.

ii. P. macr. cinereus, the gray blunt-nosed cachalot; of a blackish ash color, with a hump on the back. This variety grows to sixty and even seventy feet long, by thirty or forty in circumference; has a very large head, with very small eyes; the lower jaw is much narrower than the upper, and is furnished with a considerable number of teeth, which are received into sockets of the upper jaw when the mouth is shut. It has a hump on the back, about a foot above the general surface. It is found in Davis's Straits.

iii. P. macr. niger, is black colored, and has a hump on the back twelve inches high. This variety is found in the European seas; it grows to about sixty feet long, and thirty-six in circumference: the head is exceedingly thick, and the lower jaw, which is smaller than the upper, has forty-six teeth in two rows, which rise two inches and a half above the gums, and are received into sockets in the upper jaw. The female teats are retractile. The substance improperly named spermaceti is procured from this species; and the spermaceti, or white oil, is extracted from it. It is found in the South coasts of Brasil, Patagonia, and the Pacific Ocean. Dr. Schwediaur says that ambergris is ejected from this animal. It feeds on the sepia octopodia.

3. P. microps, the black-headed cachalot, with a long fin on the back, and the upper jaw considerably longer than the under one. A fish of this kind was cast ashore on Cramond Isle, near Edinburgh, December 22d, 1769; its length was fifty-four feet; the greatest circumference, which was just beyond the eyes, thirty; the upper jaw was fifteen feet; the lower ten. The head was of a most enormous size, very thick, and above one-third the size of the fish: the end of the upper jaw was quite blunt, and nearly nine feet high; the spout-hole was placed near the end of it. The teeth were placed in the lower jaw, twenty-three on each side, all pointing outwards; in the upper jaw, opposite to them, were an equal number of cavities, in which the ends of the teeth lodged when the mouth was closed. One of the teeth measured eight inches long, the greatest circumference the same. It was hollow withinside for the depth of three inches, and the mouth of the cavity very wide: it was thickest at the bottom, and very small at the point, bending very much; but in some the flexure is more than in others. These, as well as the teeth of all other whales, are very hard, and cut like ivory. The eyes are very small, and remote from the nose. The pectoral fins were placed near the corners of the mouth, and were only three feet long; it had no other fin, only a large protuberance on the middle of the back. The tail was a little forked, and fourteen feet from tip to tip. The penis seven feet and a half long. Linnæus informs us that this species pursues and terrifies the porpoises to such a degree as often to drive them on shore.

4. P. tursio, the high-finned cachalot, has a very long fin on the back, and the ends of the teeth are flat. It inhabits the Northern Ocean, and grows sometimes to 100 feet long; the back fin is very long, sharp-pointed, and erect, like a ship's mast, and the blowing-pipe is placed flat on the forehead: the teeth are slightly bent and have their ends flattened.

PHYS'IC, *n. s.* & *v. a.*
PHYS'ICAL, *adj.*
PHYS'ICALLY, *adv.*
PHYSIC'IAN, *n. s.*
Gr. φυσικη. Natural philosophy; particularly and more commonly the science of healing or curing diseases; remedies; medicines: to physic is to treat with medicine; and, sometimes, to cure: physical means relating to nature; helpful to health; natural as distinct from moral; medicinal: the adverb following these senses: a physician is one who professes the healing or medical art; one who prescribes medicines.

Use *physick* or ever thou be sick. *Ecclus.* xviii. 19.

In itself we desire health, *physick* only for health's sake. *Hooker.*

The labour we delight in *physicks* pain. *Shakspeare.*

It is a gallant child; one that indeed *physicks* the subject, makes old hearts fresh. *Id.*

Is Brutus sick, and is it *physical*
To walk unbraced, and suck up the humours
Of the dank morning? *Id. Julius Cæsar.*

Trust not the *physician*,
His antidotes are poison, and he slays
More than you rob. *Id. Timon of Athens.*

Some *physicians* are so conformable to the humour of the patient, as they press not the true cure of the disease; and others are so regular, as they respect not sufficiently the condition of the patient. *Bacon's Essays.*

Prayer is the best *physic* for many melancholy diseases. *Peacham.*

His gratulatory verse to king Henry is not more witty than the epigram upon the name of Nicolaus, an ignorant *physician*, who had been the death of thousands. *Id. of Poetry.*

The people use *physick* to purge themselves of humours. *Abbot.*

It is worth observing how nature hath taught all living creatures to be their own *physicians*; the same power that gave them a being hath led them to the means of their own preservation. *Bp. Hall.*

The *physical* notion of necessity, that without which the work cannot possibly be done; it cannot be affirmed of all the articles of the creed, that they are thus necessary. *Hammond.*

To poore people the good *physician* prescribes cheap but wholesome medicines; not removing the consumption out of their bodies into their purses. *Fuller.*

I call that *physical* certainty which doth depend upon the evidence of sense, which is the first and highest kind of evidence of which human nature is capable. *Wilkins.*

Time, measuring out their motion, informs us of the periods and terms of their duration, rather than effecteth or *physically* produceth the same. *Browne.*

The outward act of worship may be considered *physically* and abstractedly from any law, and so it depends upon the nature of the intention and morally, as good or evil: and so it receives its denomination from the law. *Stillingfleet*

He 'scapes the best, who nature to repair
Draws *physick* from the fields in draughts of vital air.
Dryden.

In virtue and in health we love to be instructed, as well as *physicked*, with pleasure. *L'Estrange.*

Were it my business to understand *physick*, would not the safer way be to consult nature herself in the history of diseases and their cures, than espouse the principles of the dogmatists, methodists, or chymists? *Locke.*

I do not say, that the nature of light consists in small round globules, for I am not now treating *physically* of light or colors. *Id.*

As all seasons are not proper for *physick*, so all times are not fit for purging the body politick. *Davenant.*

Though the act of the will commanding, and the act of any other faculty executing that which is so commanded, be *physically* and in the precise nature of things distinct, yet morally as they proceed from one entire, free, moral agent, may pass for one and the same action. *South's Sermons.*

Taught by thy art divine, the sage *physician*
Eludes the urn; and chains, or exiles death.
Prior.

Charity, in its origin, is a *physical* and necessary consequence of the principle of re-union. *Cheyne.*

He that lives *physically*, must live miserably. *Id.*

To reflect on those innumerable secrets of nature and *physical* philosophy, which Homer wrought in his allegories, what a new scene of wonder may this afford us! *Pope.*

PHYSIC, or PHYSICK, the art of healing, properly called medicine. The word is formed from the Gr. φυσις, nature; either because medicine consists principally in the observation of nature, or that the most important natural observations first took this direction. See MEDICINE, PHYSIC, and PHYSICS.

PHYSICAL, something belonging to, or really existing in nature. In this sense we say a physical point in opposition to a mathematical one, which only exists in the imagination; a physical substance or body, in opposition to spirit, or metaphysical substance, &c.

PHYSICIAN OF THE FLEET, in the royal navy, is a person appointed by the Admiralty with the medical superintendence of a fleet or squadron of ships employed on any particular station, as the Channel, Mediterranean, West Indies, &c., and is under the immediate orders of the commander-in-chief: if an hospital ship is with the fleet, his residence is generally on board her; if not, it is usual for him to be in the flag-ship with the commander-in-chief.

The arrangement of every thing appropriated to the reception of the sick, sent on board the hospital ship for cure, shall be under his direction; and the surgeon, and all other persons appointed to attend them. He is to propose to the commander-in-chief every thing which he may think likely to be of service to the sick, to increase their comforts, or to accelerate their cure. He is also to visit the different ships of a squadron frequently; to enquire into the health of the ships' companies, and the treatment of the sick; and, if any unusual sickness prevails on board, he is to represent the same to the commander-in-chief, with the nature of the disease, and the necessary means which he deems requisite for eradicating and putting a stop to the progress of the malady. He is also authorised to examine the journals of the medical officers, to enquire into the practice of the surgeon of any ship he visits, and his manner of treating the diseases of the men under his care, and to give him such directions as he may deem necessary. He is also to enquire into the conduct and abilities of the assistant-surgeons, that he may be able to point out to the sick and hurt board, or to the commander-in-chief, those who may be best qualified for any particular service, or for promotion. And, whenever he shall think it necessary, he is to examine the instruments, medicines, and necessaries, on board any ship.

PHYSICIAN OF A NAVAL HOSPITAL, is a person appointed by the admiralty to one of his majesty's naval hospitals, to superintend and prescribe medicine for the inward complaints of the sick and wounded seamen; and to attend such physical patients every day, or as often as circumstances may require.

PHYSICIANS. According to an ancient statute no person within London, or seven miles thereof, shall practise as a physician or surgeon, without license from the bishop of London, or dean of St. Paul's; who are to call to their assistance four doctors of physic, on examination of the persons, before granted: and in the country, without license from the bishop of the diocese, on pain of forfeiting £5 a month. Stat. 3 Hen. VIII. c. 11. By the charter for incorporating the College of Physicians, they have power to choose a president, and have a perpetual succession, a common seal, ability to purchase lands, &c. Eight of the chiefs of the college are to be called elects, who from among themselves shall choose a president yearly: and if any practise physic in the said city, or within seven miles of it, without license of the college under their seal, he shall forfeit £5. Also persons practising physic in other parts of England are to have letters testimonial from the president and three elects, unless they be graduate physicians of Oxford or Cambridge, &c. Stat. 14 and 15 Hen. VIII. c. 5, confirmed and enlarged by stat. 1 Mary, stat. 2, c. 9. 32 Hen. VIII. c. 40, ordains that four physicians, called censors, shall be yearly chosen by the college, to search apothecaries' wares, and have an oath given them for that purpose by the president; apothecaries denying them entrance into their houses, &c., incur a forfeiture of £5. And physicians refusing to make the search are liable to a penalty of 40s. And every member of the College of Physicians is authorised to practise surgery.

PHYSICIANS, COLLEGE OF. See LONDON.

PHYSICO-MATHEMATICS, a science which includes those branches of physic, which, uniting observation and experiment to mathematical calculation, undertake to explain the phenomena of nature.

PHYSICO-THEOLOGY, from physic and theology. Divinity enforced or illustrated by natural philosophy.

PHYSICS.

Physics, Lat. *physica*, of Gr. φυσις nature, is a term that has been used as synonymous both with Physiology, which see, and natural philosophy. It has, therefore, been made to embrace the entire doctrine of the bodies and existences of the universe; their phenomena, causes, and effects.

Mr. Locke would include God, angels, and spirits, under this term; but these are more usually referred to metaphysics. The more immediate and proper objects of physics are said to be body, space, and motion.

The origin of physics, thus considered, is referred, by the Greeks, to the barbarians, viz. the brachmans, magi, and the Hebrew and Egyptian priests.

From these it was derived to the Greek sages or sophi, particularly to Thales, who is said to have first professed the study of nature in Greece. Hence it descended into the Pythagoric, Platonic, and Peripatetic schools; whence it was propagated into Italy, and thence through the rest of Europe: though it is clear that the Druids, Bards, &c., had a system of physics of their own.

PART I.

History of Physical Systems.

Treatises upon this subject have usually embraced, therefore, an account of the ancient systems of the universe, replete as they are with exploded errors. We know no writer who has placed the folly of this spirit of system, the idola tribus, specus, fori et theatri of lord Bacon in a more lively manner before his readers than the abbé le Pluche.

Though we commonly, he says, give the appellation of systems to the different suppositions by which Ptolemy, Copernicus, and Tycho Brahe, have endeavoured to account for the course of the heavens, it is not what we now mean by general and systematical physics. We are now supposed to be considering a philosophy which undertakes to explain the profound construction of the whole universe. The project is noble: various celebrated philosophers have employed themselves in it; they have made numerous parties, and many disputes. The history of their pretensions may either determine us in the choice of the best side, or in remaining entirely neuter.

Epicurus, reviving the ideas of Leucippus and Democritus, thought he very well comprehended that particles of matter different in form, having subsisted from all eternity, had, after a certain time, linked themselves to one another in the vacuum; that some proceeding in straight lines, and others in curved, fell into different clusters, and formed bodies and spirits; that the free agency of man was, above all, the work of atoms which moved in a declining line; thus chance made the sun, peopled the earth, established the order which subsists in it; and framed, out of one and the same paste, the world, and the intelligent being which is the spectator of it; that we are not to imagine the sun was made to light us, or our eyes to see; but we having perceived that the sun might serve to light us, and that our eyes might serve to see with, we made use both of the sun and our eyes to that purpose.

Aristotle, and his partisans, believed the world was composed of a first matter, which, they say, had no form, but is capable of all forms; out of which the four elements issued, composing all bodies, and into which they are all resolved, or return in their last analysis. There is, indeed, some difference between this first matter and the atoms; but Epicurus and Aristotle agree in this, that they admit, at setting out, a first fund of indeterminate matter, capable of entering into all sorts of conditions and compositions.

Gassendi resumes these atoms and this vacuum of Epicurus for the construction of his world, with this difference, that he put them all into the hands of God, to give them motion according to the wise designs of his Providence.

Descartes rejects the vacuum, and will have every thing in his world full; though we can hardly reconcile the liberty of motion with a thorough exactness of plenitude. It is thus that he conceives of the creation of the world:—God, in the first place, formed an immense mass of homogeneous matter; all the different parts of which were cubical, or at least angular. He afterwards impressed on these particles a double motion. He makes the greater part of them turn on their centre, and several clusters among them round their common centre, which he names vortices. This being done, according to him, all is done; and by the friction of the angles of these parcels, from thence was formed a very fine dust, which he calls the first element or subtile matter; next a globulous matter, which he calls the second element or light; and lastly, a massive dust striped and branched, which he names the third element, from which he formed all sorts of massive bodies. This chaos, coming out of the hand of God, disposed itself in order, according to Descartes, by virtue of the two motions impressed upon it by God, and of itself became a world like ours; 'in the which, though that God placed no order or proportion,' these are his own terms 'one may see all things, as well general as particular, which appears in the real world.'

The alchymists, to be in a condition to make gold, and to prepare a restorative which immortalizes, or at least greatly prolongs life, were obliged to search to the profound of nature, and found they imagined, that salt, sulphur, and mercury, with some other ingredients, respecting which they could not agree upon among themselves, were certainly the immediate elements of metals, and all bodies; but yet there was really a first matter susceptible of all sorts of forms, as all the sages of Egypt and Greece, and all the philosophers of all ages averred; wherefore they had nothing to do but to work upon this first matter, to mould it different ways, and to give it a certain turn, to be possessed of gold, jewels, and the vivifying elixir.

Hitherto, then, we see a perfect agreement

among all these sects of philosophers upon the principal point. They all, though under different terms, go back to a chaos of the first matter, and numberless particles which are neither gold, silver, salt, bud, fruit, or any thing determinate: but which will serve for a composition of all things, by their mixtures; and into which all things may at last be resolved. The only difference we find between them in this point is, that the alchymists have more wit than the others, and make a better use of wisdom. The Aristotelians and the Corpusculists are always ready to enter into the lists about a plenum and vacuum, matter and form, the principles of bodies, and the last term of their dissolutions, and all this to no purpose. They are all battling among themselves about the best method of disposing of matter, as if the world was now to be made or governed. But, alas, it is already made, and goes on in its course without them! According to Aristotle, Epicurus, Gassendi, and Descartes, gold and sand are originally the same matter. Descartes, by breaking his cubes, saw sun, gold, and light itself, arise. Let us put the sand into motion by force of fire and friction, break its angles, deprive it of that accidental form which makes it sand, and by a proper manuduction transmute it into gold. What riches! what felicity and assistance to human society! should we once arrive to this point.

The alchemists, therefore, labored far more to the purpose apparently. If the systematical philosophers think rightly on the article of a first matter, in which they all agree, the latter think still better in reducing these speculations to practice, and attempting to change this matter so as to produce gold and immortality. But here, unluckily for the honor of this sort of philosophy, alchemists die; and not only so, but they sooner than others. The greater number of them are parched among their furnaces and pestiferous exhalations; and this is certain, they all ruin themselves. Their fruitless attempts prove the falsity of the principle which they had from the philosophers, and dispense with our entering into a tedious examination of this imaginary philosophy.

As it is but loss of time for us to stir the atoms of Gassendi, or to whirl about the angular bodies of Descartes, continues our lively abbé, we shall possibly find the attractive, centripetal, and centrifugal philosophers of the north turn to better account.

The difference between M. Descartes and Sir Isaac Newton is, that the former undertakes to account for every thing; and the other, modestly acknowledging that we are ignorant of the secrets of nature, pretends only to evince one matter of fact (see our article PHILOSOPHY) without undertaking to explain the cause; but as this one point extends, according to him, to all nature, his system for that reason becomes a kind of universal philosophy. According to M. Descartes, that gravity which causes bodies to fall is nothing different from the action of the fluids in which the planets are carried away; because all bodies moved and impelled by the bodies surrounding them, to describe a circular instead of a straight line, incessantly endeavour to recede from the centre; whence it happens that when the parts of the vortex meet with the bodies which have no centrifugal force, or which have less, they are compelled to fly to the centre; so that the precipitation of heavy bodies towards the centre is nothing but the action of more active bodies which have a tendency to avoid it.

Sir Isaac Newton at first thinks with M. Descartes, from whom he had learned it, that all bodies continue in a state of inaction, or repose, till drawn out of it or interrupted. But again, Sir Isaac Newton imagines that he has observed throughout all nature, and it is the distinguishing point of his system, that all bodies attract one another in proportion to their distance and bulk; that they have a certain tendency towards, and press upon another; that the sun tends towards the earth, and the earth towards the sun; but that, the latter being incomparably larger, we perceive only the approaches of the former towards it: that in like manner the earth tends towards the stone which is separated from it by projection, as the stone tends towards the earth, or rather that, the stone attracts the earth to it, as the earth attracts the stone; but the earth, by reason of its bulk, having a stronger attraction than a small stone, it happens from thence that the earth does not quit its place, and that the stone approaches or is drawn to it by the attractive power which the earth exercises upon it.

This action, which Newton imagines he every where perceives between bodies and bodies, throughout all nature, he calls attraction, and gives it out as an effect residing in every part of the universe, without being able to assign other cause than the will of God to put all nature in motion. Thus, the earth moving round the sun, if it was only moved, and not drawn towards it, would infinitely recede from it. The moon, if it obeyed without obstacle the law of motion which carries it away, would avoid the earth, and at length disappear. In the same manner, if the earth obeyed only the law of attraction, that law by which the sun draws the earth to it, it would draw near to, and precipitate into the sun; the moon, being only attracted, would fall upon the earth: but the earth being moved and cast off from the sun, is at the same time drawn toward it; instead of receding from it in a straight line, this line will be curved by the attraction which brings it back to the sun: being always under the influence of two powers, one of which always removes it from the sun, and the other draws it back, it describes round the sun a curved line, which Newton demonstrates ought to be an ellipsis, or near to an oval. The moon, in like manner, obeying two powers, one which makes it fly from, the other which makes it tend towards the earth, revolves round it; the centrifugal and the centripetal forces are checks one upon the other; and the moon, instead of being carried far from us by the first power, or precipitated upon our earth by virtue of the second, is, by the impression of both, kept within its orbit.

'Sir Isaac Newton afterwards examines what would be the measures of motion of the moon beginning to fall towards the earth, from the height of its orbit, after it had lost its centrifugal force, and was freed from all attraction of the

earth. The distance of the moon from the earth is known, also the duration of its revolution; one may then know what is the portion of the orbit in a minute. Geometry teaches us what space the moon runs through in a right line falling towards the earth, by virtue of the force which makes it pass through its arch, or portion of its orbit. Afterwards, having laid it down that the attraction diminishes as the square of the distance increases, Newton finds by his calculations that the moon, in falling from its station, would at first fall fifteen feet in a minute; and that near the earth, by virtue of the same law, it would in a minute pass through 3600 times fifteen feet. Lastly, examining the spaces which a body of wood or stone let fall would pass through near the earth, he concludes, from the experience gained by the fall of bodies, that a stone runs in one minute, near our globe, through 3600 times fifteen feet. The moon, being loosed from its orbit, would therefore obey the same law which precipitates the stone. By a necessary consequence, if the stone was carried as high as the orbit of the moon, being there let fall, it would run through fifteen feet in a minute. Attraction and gravity are then one and the same thing.

'M. Privat de Molieres, of the Academy of Sciences, has retained, in his Philosophical Lectures, the ground-work of Newton's observations. He admits all the proofs which show that the same cause which makes a stone gravitate upon the earth makes the earth gravitate upon the sun and the moon upon the earth; but he attributes this effect to a cause very different from that which Newton has imagined. The French academician, at the same time that he extols the exactness of the geometrical system of the learned Englishman, finds it incompatible with the plan of nature. He is not reconciled to a principle which makes of our world, one *All*, whose parts are as naked, and less united than those of a skeleton. All the ideas which we have of mechanics seem to him to be overthrown by this imaginary attraction, which, according to the partisans of the English geometrician, reciprocally acts between bodies separated by a great vacuum, and makes them move in a void, without uniting by any intermediate bond. M. Molieres resumes the vortex of M. Descartes; the existence of which seems to him to be almost palpably nature. He corrects it in the whole; and, making all the effects which Newton had observed to flow from the very structure of the vortex, he in some measure reconciles the two contending schools. This vortex is no longer composed, as Descartes has imagined, of hard inflexible globules, but of small vortices, the particles of which are incessantly inclining to recede from their peculiar centre, while the whole tends to remove from the common centre. A solid body, as the moon or earth, cast into this vortex, ought immediately to be moved by it, and carried the same way with it; but the parts of this unwieldy body being strictly united, and at rest among themselves, make no effort for motion, and have no other impulsion than what the whole body of the planet receives from the vortex in which it floats; whereas the globules of the vortex have a double motion, and make a double effort; all of them tend to remove from the common centre, the moment they are forced, by the surrounding vortices, to move in a circular line. Moreover, all the particles of these globules perform that in little, round their centre, which the great ones do in general round their common centre. From this double tendency results a double force, which more powerfully removes them from the centre than the motion impressed on the planet removes it from the centre of the sphere. The planet cast into this vortex has indeed received a centrifugal force, in receiving a circular motion; but, its parts being at rest, it has less centrifugal force than the vortex, in which this force is double, as well from the motion of the little vortices which fly from the common centre, as their particles, which all at the same time avoid their respective centres. Thus the centrifugal force in the matter of the vortex, exceeding the centrifugal force of the planet, ought to prevail: and, the planet tending less to recede from the centre than the matter which pushed it on, it must follow, that the earth will by degrees draw nearer to the sun, and the moon fall upon the earth. In a word, De Molieres makes use but of one action, or same cause, to produce the centrifugal force of the vortex, and to make the planets, and all solid bodies, gravitate to one and the same centre: instead of which Newton adds a motion impressed on all these bodies; another power and another law, which he names *attraction*, and which disposes them all to draw near to one another, with more or less velocity, in proportion to their solidity, or their distances; while, indeed, the second power is useless and inconceivable.

'M. de Molieres, after having given us this assistance, by his ingenious explanation of gravity, to comprehend the double centrifugal force of vortices, and the advance of solid bodies towards the centre, as a simple effect of this force, left us at first in doubt of the power he would make use of to sustain the planets in their orbit, and to prevent their falling upon the centre. But it was easy to perceive, at the same time, that he would be compelled to make use of different vortices, at least of different atmospheres, cast round the planets, to make them roll over one another, without falling, like the globules of different matter, which, crowding together, flatten a little by their pressure upon each other; while, in the interim, the centres which tend one towards another, by the impulsion of the encompassing vortices, can never approximate. This explanation of M. de Molieres is so much the more ingenious as it is not made use of for the creation of a world, but to give an idea of its motion and support, as it may be employed in the particular explanation of a number of phenomena, and of particular cases; such, for example, as the flux and reflux of the sea, by the pressure of the sphere of the moon on that of the earth; the shifting of the satellites of Jupiter, by the pressure of the sphere of Saturn on that of Jupiter; the attractions and repulsions of electric bodies, by the small atmospheres which they acquire or lose, according to the different manner they are touched; the dissolutions and fermentations in chemistry, by the different powers of the little

vortices which compose liquids, and which can only appear at rest when they are put in equilibrio, after a long agitation, occasioned by inequality of efforts.

'I shall not here touch upon the systems which M. Huygens, Bulfinger, Bernouilli, and many others have imagined respecting gravity; it is but a point of the mechanics of the universe. Should we ask fifty philosophers an explanation of them, there is not one of them but would believe that he gave you a philosophy that was to be esteemed in proportion to the geometry and calculations he had employed in it. Even all these indefatigable calculations will often, setting out with the same principles, lead you to as many different sums, different mechanisms, and to as many systems, as there are different persons whom you consult. What will be the consequence, when, from this point, we go on to an explanation of the bolsters of the axis, and the profound structure of the other parts of the universe. Entering into these systematical opinions will be quitting a view of nature, and losing sight of the certain use which we may make of it, and in which consists our true philosophy. Another reason to keep us upon our guard with relation to systems is, that, however beautiful they may appear at first sight, the application we may make of them to different effects generally turns out unlucky and ridiculous. Make use, for example, of the system of attraction, for the phenomenon of the loadstone, where one would think it ought to be of great use; or for electricity; or for what is called fermentation; you will find that your principle will leave you in the lurch, and will inform you in nothing; they are obliged to vary their attractions like their effects. Here, it is an attraction which acts through the whole depth of the mass: there, it is an attraction which only acts on the slightest superficies of the body, let them be thin or thick; there, a certain attraction is the same, while another attraction varies, as do the diversities of the bodies.

'I shall here end the history of systematical philosophy, because it is of little use to give a more full knowledge of it, and perhaps may be dangerous to young people, by busying their minds upon systems, which cannot fail, in spite of all our exertions, to present some phenomena to our thoughts, which is a very great prejudice to the progress of true philosophy; either because it is not easy to get rid of certain generalities, or that we see every thing conformable to our prejudices. *Experimental philosophy* is the only one which has been of use to human society; and, as we have shown that the advantages flowing from it are innumerable, so we cannot recommend for the study of philosophy a more prudent method than that which the members of the Royal Academy have followed for our instruction. They have never, as a collective body, given their approbation to any one general system. They are fully persuaded that, if man be allowed to arrive at a thorough knowledge of nature, it can be only by treasuring up experiments and facts for a great length of years; and, should even this thorough knowledge be denied to our condition, experiments at least, and the knowledge of most minute things, will procure, as is daily experienced, various benefits to public society. This very judicious principle, which they have always looked upon as a rule, and the nature of the different functions which these learned men have divided among themselves, are accurately founded on the necessaries of life, and the extent of our capacities. They go farther: the experimental philosophy which they have brought into esteem is the only useful one, because it is the only one conformable to our condition: which, without offence, we may name, The System of Providence.

'The experience of 6000 years is certainly sufficient to teach us what is possible and what is forbidden. While man, in his enquiries, was busied in things submitted to his government, his endeavours were always rewarded by new discoveries. Whenever he would pry into the interior structure of the parts of the universe, the motion of which is not submitted to his care, his ideas have been fantastical and uncertain. Let him study the measures of magnitudes, and the laws of motions; not to pace out the heavens, or to weigh the solid bodies of the planets, but to know the order of his days; let him observe the relation of the aspects of the heavens to his habitation, the progression of light in the modification in which it is presented to him; the use he may make of the equilibrium of liquids, of the weights and velocities of the bodies of which he is master, of all the experiments which come within his view, and especially under his hand; in a word, let him apply experiments to the necessaries of life, and he will have an unerring philosophy, replete with great advantages. But to undertake to determine the cause which governs the motion of the universe, and to penetrate into the universal structure, and the particular parts of which it is composed, is to forfeit the honor of improving his patrimony in order to run after shadows. It is neglecting treasures which are open to us, and obstinately persisting to knock at a door which has been shut against us these 6000 years.

'It is no conjectural opinion, but a visible truth of experience, that God has given us great facility and intelligence in things which we ought to manage; and, on the contrary, that those to which God himself gives motion and action, without entrusting the conduct to our care, he has concealed from our knowledge. For example, we are ignorant of the structure of our stomach, because God has eased us of the care of its digestion. In vain would the most able anatomist direct his digestion; all very often goes contrary to his wishes. On the other hand, we have in our senses many watchful and faithful monitors, opportunely to direct what nourishment is proper for us. Why then have we so many methods to be acquainted with our nutriment, if it is not that the care of seeking and choosing it is committed to us? And why, on the contrary, do we not know how to digest, if it be not that God has evidently willed our digestion to be performed in us without our direction? God, who has spared us that trouble, has denied us the knowledge of the mechanism which forms the flesh and the fruits that we eat, as well as the mechanism which extracts the juices from them for our nourishment. This knowledge would

have distracted us. We attain the age of fourscore and ten, without knowing what digestion is, or what is the action of the muscles. We have been served without any care on our part. Had we thoroughly known the structure of our stomach, we should have been for directing its functions. God has not allowed this knowledge to man. He ordained him to be otherwise employed. If then this mechanism be hid from him, lest it should multiply his cares, will he acquaint him with the structure of the world, the motion of which is not committed to his charge?

'The common sailor knows nothing more of the loadstone than what his senses inform him, viz. its tendency towards the North Pole. This is the sum of his knowledge. The philosopher would know the cause of this phenomenon; he employs the effluvia of its pores in spiral lines, the attractions, the repulsions; and after using his mechanics, his geometries, and calculations for several years, he either acknowledges that he himself knows nothing of the matter, or else has the mortification to find that nobody approves of his system. The systematical philosopher, who thinks himself ignorant if he know not the cause of what he sees, passes his whole life in the pursuit of possibilities, and becomes useless to the rest of mankind by being buried alive in his closet. The sailor makes use of what his senses inform him of, the direction of the loadstone towards the North, and by its assistance voyages to the end of the world. Make choice of ten thousand other informations of fact, and you will hardly find one of them but what is of service. Our fortunes will be better in proportion to this sort of knowledge. Would you seek after the causes of these effects? You will meet with nothing of certainty or use. Can we, after this, mistake the intention of God, in the measure of understanding which he affords us for our present instruction?—It is evident that we have no universal knowledge. The objects of our pursuit are scattered round us upon the earth and in the heavens. God has given us, together with eyes and understanding, a fund of curiosity which stimulates us from one object to another, that new experiments may enable us to procure new conveniencies for our brethren; and that every thing upon earth may, by degrees, be put to the best use for the profit of mankind. But, though a man can go on a stretch from Brest to Pekin, it does not follow that he can go to the moon; or though he have a principle of power in his hands that enables him to support piles of oak, and great blocks of marble in the air, this affords no reason why he should attempt with his levers to make the moon fly off from her orbit, or to fix his pulleys to the body of Jupiter, to rob him of one of his satellites. As man's strength is limited, so likewise is his knowledge, and these bounds are suited to his wants. He meets with opposition every where, when he enters upon idle speculations. But he proceeds from discovery to discovery, which discoveries work miracles, when he employs himself in making the best use of that which is about him. Our reason is always attended with success in uniting the truths of experience with the necessities of life, in making a prudent use of the benevolence of the Creator, and in giving him the glory. This is the sum total of human knowledge.'

We have inserted the above, not because we either go along with the writer in some of his objections to endeavouring after a complete knowledge of the universe, or because we approve with him M. de Moliere's qualified doctrine of the vortices: but because it contains a fair view of many theories of physics, and some excellent practical remarks on the general subject of forming them.

Let us hear the more discriminating but equally humbling account of professor Playfair, respecting the ancient physics:—'A resemblance between the events with which the observer was most familiar and those to which he was less accustomed, and which had excited his wonder, was the first object of enquiry, and produced the first advances towards generalisation and philosophy. This principle, which it were easy to trace from tribes the most rude and barbarous to nations the most highly refined, was what yielded the first attempts towards classification and arrangement, and enabled man, out of individuals subject to perpetual change, to form certain fixed and permanent objects of knowledge—the species, genera, orders, and classes, into which he has distributed these individuals. By this effort of mental abstraction he has created to himself a new and intellectual world, free from those changes and vicissitudes to which all material things are destined.

'Another great branch of knowledge is occupied, not about the mere arrangement and classification of objects, but about events or changes, the laws which those changes observe, and the causes by which they are produced. In a science which treated of events and of changes, the nature and properties of motion came of course to be studied, and the ancient philosophers naturally enough began their enquiries with the definition of motion, or the determination of that in which it consists. Aristotle's definition is highly characteristical of the vagueness and obscurity of his physical speculations. He calls motion 'the act of a being in power, as far as in power,'—words to which it is impossible that any distinct idea can ever have been annexed. The truth is however, that the best definition of motion can be of very little service in physics. Epicurus defined it to be the 'change of place,' which is no doubt the simplest and best definition that can be given; but it must, at the same time, be confessed that neither he, nor the moderns who have retained his definition, have derived the least advantage from it in their subsequent researches. The properties, or, as they are called, the laws of motion, cannot be derived from mere definition; they must be sought for in experience and observation, and are not to be found without a diligent comparison and scrupulous examination of facts. Of such an examination neither Aristotle nor any other of the ancients ever conceived the necessity, and hence those laws remained quite unknown throughout all antiquity.

'Instead of conceiving that there resides in body a natural and universal tendency to persevere in the same state, whether of rest or of motion, they believed that terrestrial bodies tended

naturally either to fall to the ground or to ascend from it, till they attained their own place; but that, if they were impelled by an oblique force, then their motion became unnatural or violent, and tended continually to decay. With the heavenly bodies, again, the natural motion was circular and uniform, eternal in its course, but perpetually varying in its direction. Thus, by the distinction between natural and violent motion among the bodies of the earth, and the distinction between what we may call the laws of motion in terrestrial and celestial bodies, the ancients threw into all their reasonings upon this fundamental subject a confusion and perplexity from which their philosophy never was delivered.

'There was, however, one part of physical knowledge in which their endeavours were attended with much better success, and in which they made important discoveries. This was in the branch of *mechanics* which treats of the action of forces *in equilibrio*, and producing not motion but rest;—a subject which may be understood, though the laws of motion are unknown. The first writer on this subject is Archimedes. He treated of the lever, and of the centre of gravity, and has shown that there will be an equilibrium between two heavy bodies connected by an inflexible rod or lever, when the point in which the lever is supported is so placed between the bodies that their distances from it are inversely as their weights. Great ingenuity is displayed in this demonstration; and it is remarkable that the author borrows no principle from experiment, but establishes his conclusion entirely by reasoning à priori. He assumes, indeed, that equal bodies, at the ends of the equal arms of a lever, will balance one another; and also that a cylinder, or parallelopiped, of homogeneous matter, will be balanced about its centre of magnitude. These, however, are not inferences from experience; they are, properly speaking, conclusions deduced from the principle of the sufficient reason. The same great geometer gave a beginning to the science of *hydrostatics*, and discovered the law which determines the loss of weight sustained by a body on being immersed in water or in any other fluid. His demonstration rests on a principle which he lays down as a postulatum, that, in water, the parts which are less pressed are always ready to yield in any direction to those that are more pressed, and from this, by the application of mathematical reasoning, the whole theory of floating bodies is derived. The above is the same principle on which the modern writers on hydrostatics proceed; they give it not as a postulatum, but as constituting the definition of a fluid. Archimedes, therefore, is the person who first made the application of mathematics to natural philosophy.

'The mechanical enquiries, begun by the geometer of Syracuse, were extended by Ctesibius and Hero; by Anthemius of Tralles; and, lastly, by Pappus Alexandrinus. Ctesibius and Hero were the first who analysed mechanical engines, reducing them all to combinations of five simple mechanical contrivances, to which they gave the name of δυναμεις, or powers, the same which they retain at the present moment. Even in mechanics, however, the success of these investigations was limited; and failed in those cases where the resolution of forces is necessary, that principle being then entirely unknown. Hence the force necessary to sustain a body on an inclined plane is incorrectly determined by Pappus, and serves to mark a point to which the mechanical theories of antiquity did not extend.

'In another department of physical knowledge, *astronomy*, the endeavours of the ancients were also accompanied with success. I do not here speak of their astronomical theories, which were indeed very defective, but of their discovery of the apparent motions of the heavenly bodies, from the observations begun by Hipparchus and continued by Ptolemy. In this their success was great; and while the earth was supposed to be at rest, and while the instruments of observation had but a very limited degree of accuracy, a nearer approach to the truth was probably not within the power of human ingenuity. Mathematical reasoning was very skilfully applied, and no men whatever, in the same circumstances, are likely to have performed more than the ancient astronomers. They succeeded, because they were observers, and examined carefully the motions of which they treated. The philosophers, again, who studied the motion of terrestrial bodies, either did not observe at all, or observed so slightly that they could obtain no accurate knowledge, and in general they knew just enough of the facts to be misled by them.'

'Though, on account of this inattention to experiment,' says our philosopher afterwards, 'nothing like the true system of natural philosophy was known to the ancients, there are nevertheless to be found in their writings many brilliant conceptions, several fortunate conjectures, and gleams of the light which was afterwards to be so generally diffused. Anaxagoras and Empedocles, for example, taught that the moon shines by light borrowed from the sun, and were led to that opinion, not only from the phases of the moon, but from its light being weak and unaccompanied by heat. That it was a habitable body, like the earth, appears to be a doctrine as old as Orpheus; some lines, ascribed to that poet, representing the moon as an earth, with mountains and cities on its surface. Democritus supposed the spots on the face of the moon to arise from the inequalities of the surface, and from the shadows of the more elevated parts projected on the plains. Every one knows how conformable this is to the discoveries made by the telescope. Plutarch considers the velocity of the moon's motion as the cause which prevents that body from falling to the earth, just as the motion of a stone in a sling prevents it from falling to the ground. The comparison is in a certain degree just, and clearly implies the notion of centrifugal force; and gravity may also be considered as pointed at for the cause which gives the moon a tendency to the earth. Here, therefore, a foundation was laid for the true philosophy of the celestial motions; but it was laid without effect. It was merely the conjecture of an ingenious mind, wandering through the regions of possibility, guided by no evidence, and having no principle which could give stability to

its opinions. Democritus, and the authors of that physical system which Lucretius has so beautifully illustrated, were still more fortunate in some of their conjectures. They taught that the Milky Way is the light of a great number of small stars, very close to one another; a magnificent conception, which the latest improvements of the telescope have fully verified. Yet, as if to convince us that they derived this knowledge from no pure or certain source, the same philosophers maintained, that the sun and the moon are bodies no larger than they appear to us to be. Very just notions concerning *comets* were also entertained by some of the ancients.

'It was, however, often the fate of such truths to give way to error. The comets, which these ancient philosophers had ranked so justly with the stars, were degraded by Aristotle into meteors floating in the earth's atmosphere; and this was the opinion concerning them which ultimately prevailed. But, notwithstanding the above, and a few other splendid conceptions which shine through the obscurity of the ancient physics, the system, taken on the whole, was full of error and inconsistency. Truth and falsehood met almost on terms of equality; the former separated from its root, experience, found no preference above the latter; to the latter, in fact, it was generally forced to give way, and the dominion of error was finally established.

'One ought to listen, therefore, with caution to the encomiums sometimes bestowed on the philosophy of those early ages. If these encomiums respected only the talents, the genius, the taste, of the great masters of antiquity, we would subscribe to them without any apprehension of going beyond the truth. But if they extend to the methods of philosophising, and the discoveries actually made, we must be excused for entering our dissent, and exchanging the language of panegyric for that of apology. The infancy of science could not be the time when its attainments were the highest; and, before we suffer ourselves to be guided by the veneration of antiquity, we ought to consider in what real antiquity consists. With regard to the progress of knowledge and improvement, 'we are more ancient than those who went before us.' The human race has now more experience than in the generations that are past, and of course may be expected to have made higher attainments in science and philosophy. Compared with natural philosophy, as it now exists, the ancient physics are rude and imperfect. The speculations contained in them are vague and unsatisfactory, and of little value, but as they elucidate the history of the errors and illusions to which the human mind is subject. Science was not merely stationary, but often retrograde; the earliest opinions were frequently the best; and the reasonings of Democritus and Anaxagoras were in many instances more solid than those of Plato and Aristotle. Extreme credulity disgraced the speculations of men, who, however ingenious, were little acquainted with the laws of nature, and unprovided with the great criterion by which the evidence of testimony can alone be examined. Though observations were sometimes made, experiments were never instituted; and philosophers, who were little attentive to the facts which spontaneously offered, did not seek to increase their number by artificial combinations. Experience, in those ages, was a light which darted a few tremulous and uncertain rays on some small portions of the field of science, but men had not acquired the power over that light which now enables them to concentrate its beams, and to fix them steadily on whatever object they wish to examine. This power is what distinguishes the modern physics, and is the cause why later philosophers, without being more ingenious than their predecessors, have been infinitely more successful in the study of nature.'

PART II.

The Claims of Modern Physical Science

After all, there is a *general connexion* between the various parts of the universe, and a general *division* of its objects. All things on this globe are connected with each other by the laws of motion and of mind. Our globe is connected with the whole of the solar system: Sir Isaac Newton has clearly proved, by gravitation. If we extend our observations to the fixed stars, the connexion by no means fails. Their inconceivable distance, indeed, renders it impossible for us to acquire any extensive knowledge of their nature. But they are evidently connected with the solar system by the identity of the light which they emit with that emitted by our sun, by their periodical motions, &c.

In this great and unbounded scene of contemplation, our attention is naturally directed to the different classes of objects in proportion to the interest we take in them. There is nothing in which we are so much interested as our fellow-men; and therefore we study their distinctive nature by attending to their characteristic appearances. But we extend this inference to a great number of beings besides our fellow-men, namely, to the whole animal creation; for in all we observe the same subserviency to the ends of the agent, in the changes which we find them continually producing in the objects around them. These changes are all adjusted to their own well-being. In all such cases, therefore, we are forced, by the constitution of our own minds, to infer the existence of design or intention in these beings also.

But, in numberless changes produced by external objects on each other, we observe no such fitness in the effects, no such subserviency to the well-being of the agent. In such cases, therefore, we make no such inference of thought or design.

Thus, then, there is presented to our observation an important distinction, by which we arrange all external objects into two classes. The first resembles ourselves, in giving external marks of that thought or intention of which we are conscious; and we suppose in them the other properties which we discover in ourselves, viz. thought, perception, memory, foresight, and all that collection of faculties which we feel in ourselves, and which constitute the animal. The other class of objects exhibit no such appearances, and we make no such inference. Thus

we divide the whole objects of external nature into the classes of *thinking* and *unthinking* beings.

Our first judgments about these classes, however, must be very inaccurate. But, when an animal dies, we observe that it no longer gives the former marks of thought and intention, and that it now resembles the class of unthinking beings, although it still retains all that fitness of organical structure which it had before. This leads us to conclude that the distinction does not arise from a difference in organical structure, but from a distinct substance common to all thinking beings, but separable from their organical frame. To this substance we ascribe thought, intention, contrivance, and all that collection of faculties which we feel in ourselves. To this substance, in ourselves, we refer all sensations, pleasures, pains, remembrances, desires, purposes; and to this aggregate, however imperfectly understood, we give the name of mind. Our organical frame, which seems to be only the instrument of information and operation to the mind, we call our body. But, as the animating principle is not like our body the immediate object of the senses, we naturally conceive it to be a substance essentially different from those which are the objects of our senses. The most savage nations have shown a disposition to form this conclusion. Observing that animal life was connected with breathing, it was natural to imagine that breathing was living, and that breath was life. It is a remarkable fact that in most languages the term for breath is one of the terms for the soul: רוח, πνευμα, spiritus, in the Hebrew, Greek, and Latin, express both; gheist or ghost, in the Teutonic, comes from gheisen, to breathe or sigh; dūcha or dūba, the soul, in Sclavonic, comes from duichat, to breathe; and so in many other languages.

Very little refinement, however, is necessary to convince us that air or breath cannot be the substance which thinks, wishes, and designs; and that the properties of this substance, whatever it is, must be totally different from, and incompatible with, any thing that we know among the immediate objects of our senses. Hence we are led to conclude that there are two kinds of substances in nature: one which is the principle of sensation, and therefore cannot be the object of our senses, more than light can be the object of the microscope. This substance only can feel, think, desire, and propose, and is the object of reflection alone. The objects of our senses compose the other class, and therefore can have none of the other properties, which are not cognoscible by the senses. These have all the properties which our senses can discover: and we can have no evidence of their having any other, nor indeed any conception of their having them. This class is not confined to the unorganised masses of matter; for we see that the bodies of animals lose after death that organical form, and are assimilated to all the rest of unthinking beings.

From such views as these, while all nations have agreed to call this class of objects by the name body, which originally expresses our organical frame, some nations, farther advanced in cultivation or refinement, have contrived an abstract term, to express this general substance of which all inanimate beings are composed. Such terms we have in the words materia, υλη, matter, &c.

Matter is that substance which is immediately and obviously cognoscible by our senses. Whatever is not thus cognoscible by our senses is immaterial; hence mind is said to be immaterial. It is of importance to keep in mind this distinction, which is more than merely grammatical. Little more is necessary for detecting the sophism of Helvetius, Mirabeau, and other sages of the Gallic school, who had endeavoured to remove the ties of moral and religious obligation by lowering our conceptions of our intellectual nature. It also shows how hastily they have formed their opinions who have ascribed to the immediate agency of mind all those relations which are observed in the actions of bodies on each other at a distance. The characteristic phenomenon, or distinguishing quality, of mind is *invention*. The phenomenon by which this quality is suggested to us is *art*, or the employment of means to gain ends; and the mark of art is the supposed conduciveness of these ends to the well being of the agent. Where this train is not evident, design or intention is never thought of. We have, and can have, no notion of mind different from those of our own minds, and we discover the existence of other minds as we discover the existence of bodies, by means of phenomena, which are characteristics of minds, and which resemble those phenomena that follow the exertion of our own mental faculties, by the employment of means to attain desired ends; and, where such appearances are not observed, no existence of a mind is inferred. When we see a man fall from the top of a house, and dash out his brains on the pavement, we never ascribe this motion to his mind. Although the fitness of many of the celestial motions for most important purposes makes us suppose design and contrivance somewhere, and therefore a Supreme Mind, we no more think of inferring a mind in the earth, from the fitness of its motions for purposes most beneficial to its inhabitants, than of inferring a mind in a bit of bread from its fitness for nourishing our bodies.

The term mind, therefore, in the ordinary language of all men, is applied to what desires and wills, at the same time that it perceives and understands. If we call that mind which produces motion, we must derive our notions of its qualities or attributes from observing their effects. We must, therefore, discover the general laws by which agents act, that is, the general laws observed in those motions which we consider as their effects. Now these are the general laws of motion; and in none of these can we find the least coincidence with what we are accustomed to call the laws of mind. Nay, it has been the total want of similarity which has given rise to the distinction which all men, in all ages and countries, have made between mind and matter. This distinction is found in all languages; and it is an unpardonable liberty which men take with languages when they use a term of distinction, a specific term, to express things of a different species. What some modern authors have been pleased to call mind, the whole world be-

sides have called by another name, force; which, though borrowed from our own exertions, is yet sufficiently distinctive, and never leads us to confound things that are different, except in the language of some modern philosophers, who apply it to the laws of agency of mind; and, when speaking of the force of motives, &c., commit the same mistakes which the followers of Aristotle commit in the use of the term mind. Force, in the language of these philosophers, means what connects the operations of mind; as mind, in the language of lord Monboddo, is that which connects the operations of body. The doctrine of elemental minds, therefore, as the immediate causes of the phenomena of the material world, is an abuse of language It is a jargon and a frivolous abuse, for it offers no explanation whatever. Of all mistakes that the naturalist can fall into, there is none more fatal to his progress in knowledge than the confounding things which are essentially different; and of all the distinctions which can be made among the objects of our contemplation, there is none of equal philosophical importance with this between mind and matter. When we consider the consequences which naturally follow from this confusion of ideas, and particularly those which follow from sinking the mental faculties of man to a level with the operations of mechanics or chemistry—consequences which the experience of the present day shows to be destructive of all that is noble or desirable in human nature, and of all that is comfortable in this life, and which blasts every hope of future excellence—we cannot be too anxious to have this capital distinction put in the plainest point of view. Such, then, are fairly the objects of this science, the subjects of philosophical study. The extent of the science is almost unbounded, reaching from an atom to God himself. It is necessary, for the successful cultivation of this immense field of knowledge, that it be committed to different cultivators, and that its various portions be treated in different ways.

Accordingly, the various tastes of men have given this curiosity different directions; and the study, like all other tasks, has been promoted by this division of labor. Some ingenious naturalists have attended only to the appearances of fitness, which are exhibited in every quarter of the universe; and by arranging these into different classes, and interpreting them as indications of thought and intention, have acquired the knowledge of many classes of sentient and intelligent beings, actuated by propensities, and directed by degrees of reason. While the contemplation of these appearances indicates thought and design in any individual of one of these classes, and brings its propensities and purposes of action, and the ends gained by these actions, into view, the contemplation of these propensities, purposes, and ends, itself occasions an inference of a much more general kind.

All these sentient beings give indications of knowledge and of power; but their knowledge bears no proportion to their powers of action and of attaining important ends; and their power is neither always, nor often, the consequence of their knowledge. Where the effects of their actions are most eminently conducive to their interests, the power of attaining these ends is generally independent on any attention to the fitness of the means, and their exertion is often made without their even knowing the end. The well-being of the individual is secured against danger by an instinctive propensity, which leads it to the performance of the necessary action, which is thus made immediately and ultimately desirable, without regard to its ultimate and important end. Thus, in our own nature, the support of animal life, and the improvement of the means of subsistence by a knowledge of the objects which surround us, are not entrusted to our apprehensions of the importance of these ends, but are committed to the surer guides of hunger and curiosity.

There is also a connexion between the individuals of a class, different from that which arises from the mere resemblance of their external appearance, or even of their propensities and pursuits. These propensities are such that, while each individual seeks only its own enjoyment, these enjoyments are in general such as contribute to the support of the species and the enjoyment of other individuals. Thus, in the classes of animals, and in human nature, the continuance of the race, and the enjoyment of the whole, are not entrusted to the apprehension we entertain of the importance of these ends, but are produced by the operation of sexual love and the love of society.

Even the different classes of sentient beings are connected together; and, while the whole of each class aim only at their own enjoyment, they contribute also to the well-being of the other classes. Man, the selfish lord of this sublunary world, is not the unconnected inhabitant of it. He cannot reap all the fruits of his situation, without contributing to the enjoyment of thousands of the brute creation. Nay, it has even been proved that while one race of animals, in consequence of its peculiar propensities, subsists by the destruction of another, the sum total of animal life and enjoyment is prodigiously increased. See a judicious dissertation on this curiand puzzling subject, entitled A Philosophical Survey of the Animal Creation; where it appears that the increase of animal life and enjoyment which is produced by these means, beyond what could possibly obtain without it, is beyond all conception. See likewise King's Origin of Evil, edited by Dr. Law.

Thus the whole assemblage seems connected, and jointly employed in increasing the sum total of possible happiness. This fitness of the various propensities of sentient and intelligent beings, this subserviency to a general purpose, strikes these observers as a mark of intention, evidently distinct from, and independent of, all the particular intentions, and superior to them all; and thus it irresistibly leads them to infer the existence of a Supreme Mind, directing the whole of this intellectual system, while the individuals of which it consists appear the unconscious instruments in the hand of a great artist, with which he executes his grand and beneficent purposes.

But the observation goes yet further:—The bodies of the inanimate creation are not only con-

nected with each other by a mutual dependence of properties, and the relation of causation, but they are also connected with the sentient beings by a subserviency to their purposes of enjoyment. The philosopher observes that this connexion is admirably kept up by the constancy of natural operations, and the expectations of intelligent beings. Had either of these circumstances been wanting, had either the operations of nature been without rule, or had sentient beings no perception or expectation of their uniformity, the subserviency would be totally at an end. This adjustment, this fitness, of which the effect is the enjoyment of the sentient inhabitants of the universe, appears to be the effect of an intention of which this enjoyment is the final cause. This constancy therefore in the operations of nature, both in the intellectual and material world, and the concomitant expectation of sentient beings, appear the effects of laws imposed on the different parts of the universe by the Supreme Mind, who has formed both these classes of beings so admirably suited to each other.

To such observers the world appears a work of art, a system of means employed for gaining certain proposed ends, and it carries the thoughts forward to an artist; and we infer a degree of skill, power, and good intention in this artist, proportioned to the ingenuity, extent, and happy effect which we are able to discern in his works. Such a contemplation of nature, therefore, terminates in natural theology, or the discovery of the existence and attributes of God.

Our notions of the Supreme Mind are formed from the indications of design which we observe, and which we interpret in the same way as in the actions of men. These notions, therefore, will differ from our notions of other minds only in the degrees which we are able to observe, and which we assign to these faculties; for the phenomenon or the effect is not only the mark, but also the measure of its supposed cause. These degrees must be ascertained by our own capacity of appreciating the extent, the multiplicity, and the variety of contrivance. Accordingly, the attributes of the Supreme Mind, in the theological creed of a rude Indian, are much more limited than in that of a European philosopher. In proportion as our understandings are enlarged, and as our acquaintance with the operations of nature around us is extended, we shall perceive higher degrees of power, of skill, and of kind intention: and, since we find that the scene of observation is unbounded, we cannot affix any boundaries to these attributes in our own imagination, and we are ready to suppose that they are infinite or unbounded in their own nature. When our attentive survey of this universe, and a careful comparison of all its parts as far as we can understand or appreciate them, have made us conclude that it is one design, the work of one artist; we are under the necessity of inferring that, with respect to this universe, his power, wisdom, and benevolence, are indeed infinite.

When men have been led to draw this conclusion from the appearances which are observed every where around them, they consider that constancy which they observe in natural operations, whether in the material or the intellectual system, and that expectation of, and confidence in, this constancy, which renders the universe a source of enjoyment to its sentient inhabitants, as the consequences of laws imposed by the Almighty artist on his works, in the same manner as they would consider the constancy in the conduct of any people as the consequences of laws promulgated and enforced by the supreme magistrate. There can be no doubt of this view of nature being extremely captivating, and likely to engage the curiosity of speculative men; and it is not surprising that the phenomena of mind have been keenly studied in all ages.

The occupations, however, of ordinary life have oftener directed our efforts towards *material* objects, and engaged our attention on their properties and relations; and as all sciences have arisen from arts, and were originally implied in the maxims and precepts of those arts, till separated from them by the curious speculatist, the knowledge of the material system of nature was possessed in detached scraps by the practitioners in the various arts of life long before the natural philosopher thought of collecting them into a body of scientific doctrines. But there have not been wanting in all ages men of curiosity who have been struck by the uniformity of the operations of nature in the material world, and were eager to discover their causes.

Accordingly, while the moralists and metaphysicians turned their whole attention to the phenomena of the mind, and have produced the sciences of pneumatology, logic, ethics, jurisprudence, and natural theology, these observers of nature have found sufficient employment in considering the phenomena of the material world.

The bodies of which it consists are evidently connected by means of those properties by which we observe that they produce changes in each other's situation. This assemblage of objects may therefore be justly called a system. We may call it the *material system*. It is frequently termed nature; and the terms natural appearances, natural causes, natural laws, have been generally restricted to those which take place in the material system. This restriction, however, is improper, because there is no difference in the manner in which we form our notions of these laws, and reason from them, both with respect to mind and body. Or if there is to be any restriction, and if any part of the study of the universe is to be excluded in the application of these terms, it is that part only which considers moral obligation, and rather treats of what ought to be than of what is. As has been already observed, there is a considerable difference in the language which must be employed; but still there is none in the principles of investigation. We have no proof of the extent of any moral law but an appeal to the feelings of the hearts of men, indicated by the general laws or facts which are observed in their actions. But this is only a question of the propriety of language. And no great inconvenience would arise from the restriction now mentioned if it were scrupulously adhered to; but unfortunately this is not always the case. Some authors use the term natural law to express every coincidence of fact; and this is certainly the proper use of the term.

The French writers generally use the term *loi physique* in this enlarged sense. But many authors, misled by, or taking advantage of, the ambiguity of language, after having established a law founded on a copious and perhaps unexpected induction of the phenomena of the material system (in which case it must be considered in its restricted sense), have, in their explanation of phenomena, extended their principle much farther than the induction on which they had founded the existence of the physical law. They have extended it to the phenomena of mind, and have led their followers into great and dangerous mistakes.

Physics, then, is with us the study of the material system, including both natural history and philosophy. The term is not indeed very familiar in our language; and, in place of physicus and disciplina physica, we more generally use the terms naturalist and natural knowledge. The term natural philosophy, in its common acceptation, is of less extent. The field of physical investigation is still of prodigious extent; and its different quarters require very different treatments, make very different returns, and accordingly have engaged in their particular cultivation persons of very different talents and tastes. It is of some importance to perceive the distinctions, and to see how the wants and propensities of men have led them into the different paths of investigation; for, as has been more than once observed, all sciences have sprung from the humble arts of life, and both go on improving by means of a close and constant correspondence.

All the *phenomena* of the material system may be arranged into two classes, distinguished both by their objects and by the proper manner of treating them. The first class comprehends all the appearances which are exhibited in the sensible motions of bodies, and their actions on each other, producing sensible motion. The second class comprehends the appearances which are exhibited in the insensible motions and actions of the invisible particles of matter.

Of the phenomena of the first class we have examples in the planetary motions, the motions of heavy bodies, the phenomena of impulse, the motions and actions of machines, the pressure and motions of fluids, the sensible actions of magnetical and electrical bodies, and the motions of light.

We have examples of the second class in the phenomena of heat and mixture, and those exhibited in the growth of animals and vegetables, and many phenomena of solid, fluid, magnetical, electrical, and luminous bodies, in which no change of place can be observed.

Thus it appears that there is a distinction in the phenomena sufficiently great to warrant a division of the study, and to make us expect a more rapid improvement by this division. Nay, the division has been made by nature herself, in the acquaintance which men have attained with her operations without study, before science appeared, and while art constituted all our knowledge.

In the phenomena of the first class, again, we see the immediate exertion of the connecting principle between the concomitant events, whatever it may be; we can observe the exertion with accuracy; we can determine its kind and degree: and this exertion, being always some modification of motion, allows us to call in the aid of mathematical knowledge, and thus to ascertain with precision the energy of the cause; judging of the tendency and quantity by the tendency and the quantity of the observed effect.

But in the second class of phenomena the case is very different. In the operations of chemistry, for instance, the immediate exertion of the cause is not perceived: all that we observe is the assemblage of particles which obtains before mixture, and that which takes place when it is completed, and which we consider as its result. The procedure of nature in producing the change is unseen and unknown. The steps are hid from our observation. We are not only ignorant of the cause which determines one particle of our food to become a part of our body, while others are rejected, but we do not see the operation. We are not only ignorant of the cause which determines a particle of vitriolic acid to quit the fossil alkali with which it is united in Glauber's salt, and to attach itself to a particle of magnesia already united with the muriatic acid, which also quits it to unite with the alkali, but we do not see the operation. The particles and their motions are not the objects of our senses; and all that we see is the Epsom salt and common salt separate from the water in which we had formerly dissolved the sal mirabile and the muriated magnesia. The motions, which are the immediate effects of the changing causes, and therefore their only indications, characteristics, and measures, fitted to show their nature, are hid from our view.

Our knowledge therefore of these phenomena must be less perfect than that of the phenomena of the former class; and we must here content ourselves with the discovery of more remote relations and remote causes, and with our ignorance of the very powers of nature by which these changes are brought about, and which are cognoscible only by their immediate effects, viz. the motions which they produce unseen. The knowledge which we do really acquire is somewhat similar to what the mechanical philosopher has acquired when he has discovered, by many experiments and investigations, that magnets attract each other by their dissimilar poles, and repel each other by their similar poles, and do not act at all on any bodies but loadstones and iron. Here we leave undiscovered all that is most curious in the phenomenon, viz. how these attractions and repulsions are produced; and even here the magnetical philosopher has the advantage of seeing the agents and the operation.

This distinction in the nature of the phenomena, and this difference in the nature of the knowledge which is to be acquired, and the means which are to be employed for the successful prosecution of these two branches of general physics, has occasioned a still further restriction (at least in Britain) of the term natural philosophy. It is particularly applied to the study of the phenomena of the first class, while those of the second have produced the sciences of chemistry and physiology.

Natural philosophy and chemistry have generally been made particular institutions in our seminaries of learning, but physiology has more commonly been taught in conjunction with anatomy, medicine, and botany.

The phenomena of the first class have been usually called mechanical, in order to distinguish them from those observed in the operations of chemistry, and in the animal and vegetable economy; and the explanations which have been attempted of some of the last, by applying the laws observed in the phenomena of the first class, have been called mechanical explanations.

As this first class is evidently but a part of general physics, there is some impropriety in giving the name natural philosophy to a course of doctrines which is confined to these alone. Indeed, at the first institution of universities, the lectures given in the Schola Physica were much more extensive, comprehending almost all the phenomena of the material world: but, as all arts and sciences have improved most where the labor has been most divided, it was found more conducive to the advancement of knowledge that separate institutions should be founded for the studies of natural history, chemistry, physiology, &c.; and thus the phenomena, purely mechanical, and a few others in magnetism, electricity, and optics, which either were susceptible of mathematical treatment, or had little connexion with the studies of chemistry and physiology, were left to the care of the professor of natural philosophy.

As the terms chemistry and physiology have been applied to two very important branches of general physics, we think that a more specific or characteristic name might be appropriated to the other, and that it might very properly be termed mechanical philosophy.

It only remains to make a few observations on the distinctive means of prosecuting these studies with success, and to point out some of the advantages which may reasonably be expected from a careful prosecution of them; and as the second branch is fully treated under the several articles of CHEMISTRY, PHYSIOLOGY, &c., we shall confine ourselves to what is usually called natural philosophy.

Mechanical philosophy may, in conformity with the foregoing observations, be defined, 'the study of the sensible motions of the bodies of the universe, and of their actions producing sensible motions with a view to discover their causes, to explain subordinate phenomena, and to improve art.'

The principle upon which all philosophical discussion proceeds is, that every change which we observe in the condition of things is considered by us as an effect, indicating the agency, characterising the kind, and measuring the degree of its cause. In the language of mechanical philosophy, the cause of any change of motion is called a moving or changing force. The disquisitions of natural philosophy must therefore begin with the consideration of motion, carefully noticing every affection or quality of it, so as to establish marks and measures of every change of which it is susceptible; for these are the only marks and measures of the changing forces. This being done, it only remains to apply them to the motions which we observe in the universe.

From the general principle of philosophical discussion already mentioned, there flow directly two axioms. 1. Every body perseveres in a state of rest or of uniform rectilineal motion, unless affected by some moving force. 2. Every change of motion is in the direction and in the degree of the force impressed.

These are usually called the laws of motion. They are more properly laws of human judgment with respect to motion. Perhaps they are necessary truths, unless it be alleged that the general principle, of which they are necessary consequences, is itself a contingent though universal truth. By these two axioms, applied in abstracto to every variety of motion, we establish a system of general doctrines concerning motions, according as they are simple or compounded, accelerated, retarded, rectilineal, curvilineal, in single bodies, or in systems of connected bodies; and we obtain corresponding characteristics and measures of accelerating or retarding forces, centripetal or centrifugal, simple or compound. We have an illustrious example of this abstract system of motion and moving forces in the first book of Sir Isaac Newton's Mathematical Principles of Natural Philosophy. Euler's Mechanica sive Scientia Motûs, Herman's Photonomia sive de Veribus Corporum, and D'Alembert's Traité de Dynamique, are also excellent works of the same kind. In this abstract system no regard is paid to the casual differences of moving forces, or the sources from which they arise. It is enough to characterise a double accelerating force, for instance, that it produces a double acceleration. It may be a weight, a stream of water, the pressure of a man; and the force, of which it is said to be double, may be the attraction of a magnet, a current of air, or the action of a spring. Having established these general doctrines, the philosopher now applies them to the general phenomena of the universe, in order to discover the nature of the forces which really exist, and the laws by which their operations are regulated, and to explain interesting but subordinate phenomena. This is the chief business of the mechanical philosopher; and it may with some propriety be called the mechanical history of nature.

Some method must be followed in this history of mechanical nature. The phenomena must be classed by means of their resemblances, which infer a resemblance in their causes, and these classes must be arranged according to some principle. We have seen no method which appears to us less exceptionable than the following:—The principle of arrangement is the generality of the phenomena; and the propriety of adopting this principle arises from the probability which it gives us of more readily discovering the most general actuating forces, whose agency is implicated in all other phenomena of less extent; and therefore should be previously discussed, that we may detect the discriminating circumstances which serve to characterise the subordinate phenomena, and are thus the marks of the distinguishing and inferior natural powers.

The most general of all phenomena is the curvilineal motion of bodies in free space; it is ob-

served through the whole extent of the solar system.

The mechanical history of nature begins therefore with *astronomy*. Here, from the general phenomena of the planetary motions, is evinced the fact of the mutual deflection of every body towards every other body, and this in the inverse proportion of the squares of the distance, and the direct proportion of the quantity of matter. This is the fact of universal gravitation, indicating the agency, and measuring the intensity, of the universal force of mutual gravity. Having established this as a universal fact, the natural philosopher proceeds to point out all the particular facts which are comprehended under it, and whose peculiarities characterise the different movements of the solar system. That is, in the language of philosophy, ne gives a theory or explanation of the subordinate phenomena; the elliptical motions of the planets and comets, their mutual disturbances; the lunar irregularities; the oblate figure of the planets; the nutation of the earth's axis; the precession of the equinoxes; and the phenomena of the tides and trade winds; and he concludes with the theory of the parabolic motions of bodies projected on the surface of this globe, and the motion of pendulums. As he goes along, he takes notice of the applications which may be made to the arts of life of the various doctrines which are successively established, such as chronology, astronomical calculation, dialling, navigation, gunnery, and the measuring of time. If a square parcel of sand be lying on the table, and the finger be applied to any part of it to push it along the table, that part is removed where you will, but the rest remains in its place; but if it is a piece of sand-stone of the same materials and shape, and the finger is applied as before, the whole is moved; the other parts accompany the part impelled by the finger in all its motions.

From the moon's accompanying the earth in all its motions round the sun we infer a moving force which connects the moon and earth. In like manner, we must conclude that a moving force connects the particles of the stone; for we give the name force to every thing which produces motion; we call it the force of cohesion; a term which, like gravitation, expresses merely a fact. This seems to be the next phenomenon of the universe in point of extent.

Having, from the general phenomenon, established the existence of this force, the philosopher proceeds to ascertain the laws by which its exertions are regulated; which is the ascertaining its distinctive nature and properties. This he does in the same way that he ascertained the nature of planetary gravitation, viz. by observing more particularly the various phenomena. And here is opened a most extensive and varied field of observation, in which it must be acknowledged that very little regular and marked progress has been made. The variety in the phenomena, and the consequent variety in the nature of the connecting forces, appear as yet inconceivably great; and there seems little probability of our being able to detect in them all any sameness, combined with the other distinguishing circumstances, as we have done in the case of gravity. Yet we should not despair.

Boscovich has shown, in the most unexceptionable manner, that although we shall suppose that every atom of matter is endued with a perfectly similar force, acting in a certain determined ratio of the small and imperceptible distances at which the particles of matter are arranged with respect to each other, the external or sensible appearances may, and must, have all that variety which we observe. He also shows very distinctly, how, from the operation of this force, must arise some of the most general and important phenomena which characterise the different forms of tangible bodies. We observe the chief varieties of the action of this corpuscular force on the bodies which we denominate hard, soft, solid, fluid, vaporous, brittle, ductile, elastic. We see instances where the parts of bodies avoid each other, and require external force to keep them together, or at certain small distances from each other. This is familiar in air, vapors, and all compressible and elastic bodies. This is evidently a most curious and interesting subject of investigation. On the nature and action of these corpuscular forces depend the strength or firmness of solids, their elasticity, their power of communicating motion, the pressure, and motion, and impulse of fluids; nay, on the same actions depend all the chemical and physiological phenomena of expansion, fusion, congelation, vaporisation, condensation, solution, precipitation, absorption, secretion, fermentation, and animal and vegetable concoction and assimilation.

Out of this immense store of phenomena, this inexhaustible fund of employment for our powers of investigation, the natural philosopher selects those which lead directly to the production or modification of sensible motion.

He will therefore consider.

1. The communication of motion among detached and free bodies, establishing the laws of impulse or collision. This has always been considered as the elementary doctrine of mechanical philosophy, and as the most familiar fact observed in the material world; amd in all ages philosophers have been anxious to reduce all actions of bodies on each other to impulse, and have never thought a phenomenon completely explained or accounted for till it has been shown to be a case of impulse. This it is which has given rise to the hypotheses of vortices, ethers, magnetic and electric fluids, animal spirits, and a multitude of fancied intermediums between the sensible masses of matter, which are said in common language to act on each other. A heavy body is supposed to fall, because it is impelled by a stream of an invisible fluid moving according to certain conditions suited to the case. The filings of iron are supposed to be arranged round a magnet by means of a stream of magnetic fluid issuing from one pole, circulating perpetually round the magnet, and entering at the other pole, in the same manner as we observe the floating grass arranged by the current of a brook. But the philosopher who has begun the mechanical study of nature by the doctrine of dynamics, and made its first application to the celestial phenomena, and who has attended carefully to the many analogies between the phenomena of gravitation and

cohesion will be at least ready to entertain very different notions of this matter. He will be so far from thinking that the production of motion by impulse is the most familiar fact in nature, that he will acknowledge it to be comparatively very rare; nay, there are some appearances, in the facts which are usually considered as instances of impulsion, which will lead him to doubt, and almost to deny, that there has ever been observed an instance of one body putting another in motion by coming into absolute contact with it, and striking it; and he will be disposed to think that the production of motion in this case is precisely similar to what we observe when we gently push one floating magnet towards another, with their similar poles fronting each other. There will be the same production of motion in the one and diminution of it in the other, and the same uniform motion of the common centre of gravity: and, in this case of the magnets, he sees completely the necessity of a law of motion, which is not an axiom, but is observed through the whole of nature, and which receives no explanation from any hypothesis of an intervening fluid, but is even totally inconsistent with them. We mean, that every action of one body on another is accompanied by an equal and opposite action of that other on the first. This is usually called the equality of action and reaction: it is not intuitive, but it is universal; and it is a necessary consequence of the perfect similarity of the corpuscular forces of the same kinds of matter. This general fact, unaccountable on the hypothesis of impelling fluids, is considered in the planetary motions as the unequivocal indication of the sameness of that gravity which regulates them all. The rules of good reasoning should make us draw the same conclusion here, that the particles of tangible matter are connected by equal and mutual forces, which are the immediate causes of all their sensible actions, and that these forces, like gravitation, vary with every change of distance and situation. The laws of collision and impulsion being now established, either as original facts or as consequences of the agency of equal and mutual force, which connect the particles of matter, the philosopher considers,

2. The production of motion by the intervention of solid bodies, where, by reason of the cohesion of matter, some of the motions are necessarily confined to certain determinate paths or directions. This is the case in all motions round fixed points or axes, or along planes or curves which are oblique to the action of the forces. This part of the study contains the theory of machines, pointing out the principles on which their energy depends, and consequently furnishing maxims for their construction and improvement. But these observations do not complete the discussion of the mechanism of solid bodies: they are not only solid and inert, but they are also heavy; therefore the action of gravity must be combined with the consequences of solidity. This will lead to discussion about the centre of gravity, the theory and construction of arches and roofs, the principles of stability and equilibrium, the attitudes of animals, and many particulars of this kind.

3. The philosopher will now turn his attention to another form, in which tangible matter exhibits many interesting phenomena, viz. fluidity. The first thing to be attended to here is, What is that particular form of existence? What is the precise phenomenon which characterises fluidity? What is the definition of a fluid? This is by no means an easy question, and considerable objections may be stated against any definition that has been given of it. Sir Isaac Newton says that a fluid is a body whose particles yield to the smallest impression, and by so yielding are easily moved among themselves. It may be doubted whether this be sufficiently precise; what is meant by the smallest impression? and what is easily moving? Is there any precise degree of impression to which they do not yield; and do they oppose any resistance to motion? And a stronger objection may be made. It is not clear that a body so constituted will exhibit all the appearances which a body acknowledged to be fluid does really exhibit. Euler offers some very plausible reasons for doubting whether it will account for the horizontal surface, and the complete propagation of pressure through the fluid in every direction; and therefore prefers selecting this last phenomenon, the propagation of pressure quaqua versum, as the characteristic of fluidity, because a body having this constitution (on whatever circumstances it may depend) will have every other observed property of a fluid. But this definition is hardly simple or perspicuous enough; and we think that the objections against Newton's more simple and intelligible definition are not unanswerable. Boscovich defines a fluid to be a body whose particles exert the same mutual forces in all directions; and shows that such particles must be indifferent, as to any position with respect to each other. If no external force act on them, they will remain in every position, and will have no tendency to arrange themselves in one position rather than another; differing in this respect from the particles of solid, or soft, or viscid bodies; which require some force to change their respective positions, and which recover these positions again when but gently disturbed. He illustrates this distinction very beautifully, by comparing a parcel of balls thrown on quicksilver, and attracting each other with a parcel of magnets in the same situation. The balls will stick together, but in any position; whereas the magnets will always affect a particular arrangement.

When the characteristic phenomenon of fluidity has been selected, the philosopher proceeds to combine this property with gravity, and establishes the doctrines of hydrostatics, or of the pressure, and equilibrium of heavy fluids, the propagation of this pressure in every direction; and demonstrates the horizontality of surface assumed by all perfect fluids. These doctrines and principles enable us to determine several very interesting circumstances respecting the mutual pressure of solids and fluids on each other; the pressures exerted on the bottoms and sides of vessels; the support and mechanism of floating bodies, &c.

He then considers how fluids will move when their equilibrium of pressure is destroyed; and

establishes the doctrines of hydraulics, containing all the modifications of this motion, arising from the form of the vessels, or from the intensity or direction of the pressure which occasions it. And this subject is completed by the consideration of the resistance which fluids oppose to the motion of solid bodies through them, and their impulse on bodies opposed to their action. These are very important matters, being the foundations of many mechanical arts, and furnishing us with some of our most convenient and efficacious powers for impelling machines. They are also of very difficult discussion, and are by no means completely investigated or established. It is evident that on these doctrines depend the knowledge of the motions of rivers and of waves; the buoyancy, equilibrium, and stability of ships; the motion of ships through the waters; the action of the winds on the sails; and the whole arts of marine construction and seamanship.

There is another general form of tangible matter which exhibits very different phenomena, which are also extremely interesting; we mean that of vapor. A vapor is a fluid; and all the vapors that we know are heavy fluids: they are therefore subject to all the laws of pressure and impulse which have been considered under the articles Hydrostatics and Hydraulics. But they are susceptible of great compression by the action of external forces, and expand again when these forces are removed. In consequence of this compression and expansion, the general phenomena of fluidity receive great and important modifications; and this class of fluids requires a particular consideration. As air is a familiar instance, this branch of mechanical philosophy has been called Pneumatics.

The philosopher examines the law of compressibility of air and other elastic fluids: and thus obtains the knowledge of the constitution of the atmosphere, and of the actions of those fluids when employed to impel solid bodies. Gunpowder contains an immense quantity of permanently elastic air, which may be set at liberty by inflammation. When this is done at the bottom of a piece of ordnance, it will impel a ball along the barrel and discharge it from the muzzle in the same way that an arrow is impelled by a bow. And thus, having discovered in what degree this air presses in proportion to its expansion, we discover its action on the ball through the whole length of the piece, and the velocity which it will finally communicate to it. Here then is contained a theory of artillery and of mines.

Chemistry teaches us that most bodies can be converted by fire into elastic fluids, which can be employed to act on other bodies in the way of pressure or impulse. Thus they come under the review of the mechanical philosopher; and they have become interesting by being employed as moving forces in some very powerful machines. These discussions will nearly exhaust all the general mechanical phenomena. There remain some which are much more limited, but furnish very curious and important subjects of investigation.

The phenomena exhibited between loadstones or magnets and iron have long attracted attention; and the use to which the polarity of the loadstone has been applied, namely, the directing the course of a ship through the pathless ocean, has rendered these phenomena extremely interesting. They are specified by the term *magnetism*. Considerable progress has been made in the arrangement and generalisation of them; but we have by no means been able hitherto to bring them all under one simple fact. The attention has been too much turned to the discovery of the ultimate cause of magnetism; whereas we should rather have employed our ingenuity in discovering all the general laws, in the same manner as Kepler and Newton did with respect to the celestial phenomena, without troubling themselves with the cause of gravitation. Dr. Gilbert of Colchester was the first who considered the magnetical phenomena in the truly philosophical matter; and his treatise De Magnete may be considered as the first and one of the most perfect specimens of the Baconian or inductive logic. It is indeed an excellent performance; and when we consider its date, 1580, it is a wonder. Mr. Barlow is one of the latest successful experimenters in this department, and the important practical use to which his discoveries have been already put will be seen in our article Magnetism.

There is another class of mechanical phenomena which has a considerable affinity with the magnetical; we mean the phenomena called electrical. Certain bodies, when rubbed or otherwise treated, attract and repel other bodies, and occasion a great variety of sensible motions in the neighbouring bodies. Philosophers have paid much attention to these appearances, and established many general laws concerning them. But we have not been more successful in bringing them all under the fact, and thus establishing a complete theory of them, than in the case of magnetism.

And there are many phenomena of electricity which cannot be called mechanical, but are still of the most curious and interesting kind. As these have little connexion with any of the other great branches of physical science, they have generally been considered in treatises of natural philosophy; and, along with enquiries into the original cause of electricity in general, continue to engage much attention. See Electricity.

The appearances which are presented to us by our sense of seeing form another class, which have always been considered as making a branch of natural philosophy in all seminaries of learning. It does not, however, obviously appear, that they are mechanical phenomena. The nature of light is still a secret. Fortunately it is not necessary to be known to give us a very perfect theory of the chief phenomena. The general laws of *optics* are so few, so simple, and so precise, that our theories are perhaps more perfect here than in any other branch of physics; but these theories are as yet far removed from the rank of primary facts. Many unknown events happen before the phenomenon comes under the hands of the ordinary optician, so as to become the subjects of the simple laws of reflection and refraction. It may even be doubted, and has

been doubted, whether the phenomena of optics are cases of body in motion; or whether all the lines which the optician draws are any thing but the directions along which certain qualities are exerted. See OPTICS and VISION.

The questions about the activity or inactivity of matter are not physical, but metaphysical. Natural philosophy, it is true, commonly takes it for granted that matter is wholly inactive; but it is not of any moment in physics whether this opinion is true or false: whether matter is acted on according to certain laws, or whether it acts of itself according to the same laws, makes no difference to the natural philosopher. It is his business to discover the laws which really obtain, and to apply these to the solution of subordinate phenomena: but whether these laws arise from the nature of some agent external to matter, or whether matter itself is the agent, are questions which may be above his comprehension, and do not immediately concern his proper business.

PHYSIOGNOMY.

PHYSIOG'NOMIST, *n. s.*
PHYSIOGNOM'IC, *adj.*
PHYSIOG'NOMY, *n. s.*
Fr. *physionomiste, physionomie*; Gr. φυσιογνωμονια. One who professes to know the temper or disposition by the look or features: relating to the face or cast of countenance: the act or art of knowing the character or fortune by the face. See below.

In all *physiognomy*, the lineaments of the body will discover those natural inclinations of the mind which dissimulation will conceal, or discipline will suppress. *Bacon's Nat. Hist.*

Digonius, when he should have been put to death by the Turk, a *physiognomer* wished he might not die, because he would sow much dissention among the Christians. *Peacham.*

The astrologer, who spells the stars,
Mistakes his globes, and in her brighter eye
Interprets heaven's *physiognomy*. *Cleaveland.*

They'll find i' th' *physiognomies*
O' th' planets all men's destinies. *Hudibras.*

There is surely a *physiognomy* which master mendicants observe; whereby they instantly discover a merciful aspect, and will single out a face wherein they spy the signatures and marks of mercy. *Sir S. Browne.*

The end of portraits consists in expressing the true temper of those persons which it represents, and to make known their *physiognomy*. *Dryden's Dufresnoy.*

Apelles made his pictures so very like, that a *physiognomist* and fortune-teller foretold, by looking on them, the time of their deaths whom those pictures represented. *Dryden.*

The distinguishing characters of the face, and the lineaments of the body, grow more plain and visible with time and age; but the peculiar *physiognomy* of the mind is most discernible in children. *Locke.*

Let the *physiognomists* examine his features. *Arbuthnot and Pope.*

PHYSIOGNOMY, Gr. φυσιογνωμια of φυσις, nature, and γνωσκω, has been called the science by which the dispositions of mankind are discoverable from the bodily form, and particularly from the features of the countenance. The term seems to have been introduced by Aristotle who thus lays down the leading principles of this study:—A peculiar form of body, he says, is invariably accompanied by a peculiar disposition of mind; a human intellect is never found in the corporeal form of a beast. The mind and body reciprocally affect each other: thus in intoxication and mania the mind exhibits the affections of the body; and, in fear, joy, &c., the body displays the affections of the mind. Hence, he argues, when in man a particular bodily character appears, which by prior experience and observation has been found uniformly accompanied by a certain mental disposition (with which therefore it must have been necessarily connected), we are entitled in all such cases to infer the disposition from the appearance. Our observations, he conceives, may be drawn from other animals as well as from men: for as a lion possesses one bodily form and mental character, a hare another, the corporeal characteristics of the lion, such as strong hair, deep voice, large extremities, discernible in a human creature, denote the strength and courage of that noble animal; while the slender extremities, soft down, and other features of the hare, visible in a man, betray the mental character of that pusillanimous creature. Upon this principle Aristotle treats of the corporeal features of man, and the correspondent dispositions, so far as observed: he illustrates them by the analogy just mentioned, and attempts also to account for them physiologically; distinctly noticing individual, national, and comparative physiognomy.

After Aristotle, his disciple and successor Theophrastus deserves to be mentioned as a writer on this subject. Polemon of Athens, Adamantius the sophist, and several others, wrote on the subject about the same period. Indeed from a modern collection of the Greek authors on physiognomy (Physiognomiæ veteris Scriptores Græci, Gr. et Lat. a Franzio Altenb. 1780, 8vo.), it would appear that the science was much cultivated in Greece; but the professors seem always to have connected with it much of the marvellous.

In the works of Hippocrates and Galen many physiognomical observations occur; and Cicero appears to have been attached to the science. In his oration against Piso, as well as in that in favor of Roscius, the classical reader will remember how the orator adapts physiognomy to his purpose. Physiognomical remarks are also to be found in the writings of Sallust, Suetonius, Seneca, Pliny, Aulus Gellius, Petronius, Plutarch, &c. It seems that in the Roman empire this science was even practised as a profession. Suetonius, for instance, in his life of Titus, states that Narcissus employed a physiognomist to examine the features of Bri-

tannicus, who predicted that he would not succeed, but that the empire would devolve on Titus.

From the beginning of the sixteenth century until the close of the seventeenth this was a very fashionable study. Within that period appeared almost all the approved modern authors on the subject, prior to Lavater. They are Bartholom. Cocles, Baptista Porta, Honoratus Nuqueties, Jacobus de Indagine, Alstedius, Michael Scottus, Gaspar Schottus, Cardan Taishierus, Fludd, Behmen, Barclay, Claromontius, Conringius, the commentaries of Augustin Niphus, and Camillus Balbus on the Physiognomica of Aristotle,—Spontanus, Andreas Henricus, Joannes Digander, Rud. Goclenius, Alex. Achillinus, Joh. Prætorius, Jo. Belot, Guliel. Gratalorus, &c. See Polyhistor. Morhoff. vol. I. lib. i. cap. 15. § 4, and vol. II. lib. iii. cap. 1. § 4.

During every period in which this pursuit has been in vogue, alchemy, magic, judicial astrology, the doctrine of signatures, and sympathies, or some other of the occult sciences has flourished. The first respectable writer on the subject in the eighteenth century was Dr. Gwyther. His remarks are published in the Philosophical Transactions, vol. xviii. Dr. Parsons, next chose it for the subject of the Croonian lectures, published at first in the second supplement to the forty-fourth volume of the Philosophical Transactions, and afterwards (1747) in a separate treatise. The observations, however, of these writers, as well as of Lancisius, Haller, and Buffon, relate rather to the momentary expression of the passions by the features than to any permanent system respecting them. The characters of Le Brun were illustrative of the same kind of transient physiognomy.

In the Berlin Transactions of the last century essays by Pernetty and Le Cat first drew the attention of the public to the modern system; and soon after the controversy between these parties Lavater's celebrated work appeared.

Accident, we are told, led him to the study of physiognomy; standing at a window with the celebrated Zimmerman, he was led to make such remarks on the singular countenance of a soldier who was passing as induced his friend to urge him to pursue his ideas. He accordingly began his work, and in process of time, with the natural progress of an enthusiastical mind, acquired not only a fondness for the study, but a full conviction of the reality of the physiognomical science, and of his own great discoveries in it. In 1776 he published the first fruits of his labors in a quarto volume, entitled Fragments. He took in them a wide range of enquiry, and carried his ideas beyond the observation of those parts of the countenance which exhibit to a common eye the impressions of mental qualities and affections; maintaining, as a leading position, 'that the powers and faculties of the mind have representative signs in the solid parts of the countenance.' Two more volumes appeared in succession, which presented a most extraordinary assemblage of subtle and refined reasoning, delicate feeling, and philanthropical and pious sentiment, together with a large admixture of mysticism, paradox, and extravagance. The whole work was illustrated with engravings; many of which were highly finished and expressive. It was soon translated into the French and English languages, and became the favorite topic of literary discussion.

In pointing out the distinguishing traits of different nations, Lavater observes, that the placing of several persons together, selected from nations remotely situated from each other, gives at one glance their great varieties of visage; yet he acknowledges that to point out those variations is a task of considerable difficulty. The French, he thinks, do not possess equally commanding traits with the English, nor are they so minute as those of the Germans, and it is to the peculiarities of their teeth, and manner of laughing, that he attributed his power of deciding on their origin. The Italians he appropriated by the form of their noses, their diminutive eyes, and projecting chins. The eye-brows and foreheads are the criterion by which to judge of the natives of England. The Dutch possess a particular rotundity of the head, and have weak, thin hair: the Germans, numerous angles and wrinkles about the eyes and in the cheeks; and the Russians are remarkable for black and light colored hair, and flat noses. Judging from the ladies he had seen of our country, and from numerous portraits of others, Lavater was led to say, they appeared to him wholly composed of nerve and marrow, tall and slender in their forms, gentle, and as distant from coarseness and harshness as earth from heaven.

Our author commences his analysis of the human face with the forehead; and, anticipating the discoveries of our phrenological friends, he here observes that the general form, proportion, arch, obliquity, and position of the skull of the forehead, denote the degree of thought, sensibility, mental vigor, and prepensities of the man: at the same time the skin of this part of the head explains, by its hue, tension, or wrinkles, the state of the mind at the moment of observation, and the passions which influence it: he seems to have been the first who attended to the peculiar turns of the position and outline of the forehead, which he considered the most important part presented for the study of the physiognomist. This he divides into three classes, the perpendicular, the projecting, and the retreating forehead, each possessing a number of variations: the principal, however, are rectilinear, 'half round, half rectilinear, flowing into each other; half round, half rectilnear, interrupted; curve-lined, simple; the curve-lined double and triple.' A long forehead indicates capacity of comprehension, and less activity; a compressed, short, and firm, forehead, more compression, stability, and little volatility; severity and pertinacity belong to the rectilinear; and the more curved than angular portends flexibility and tenderness of character: deficiency of understanding is discoverable in those whose foreheads are perpendicular from the hair to the eye-brows; but the perfectly perpendicular, gently arched at the top, signifies that the possessor thinks coolly and profoundly. The projecting forehead indicates stupidity and mental weakness; the retreating, exactly the reverse; the circular, and prominent above, with straight

lines below, and nearly perpendicular, shows sensibility, ardor, and good understanding; the rectilinear oblique forehead has the same properties; arched foreheads are considered as feminine; a union of curved and straight lines, happily disposed, with a similar position of the forehead, gives the character of consummate wisdom. 'Right lines, considered as such, and curves, considered as such, are relaxed, as power and weakness, obstinacy and flexibility, understanding and sensation.' When the bones surrounding the eye project, and are sharp, the person thus formed possesses strong mental energy. Perpendicular foreheads, which, however, project so as not to rest on the nose, and which are short, small, shining, and full of wrinkles, give undoubted indications of weakness; perseverance and oppressive violent activity, united with harshness, belong to the forehead composed of various confused *protuberances;* and, on the other hand, when the profile of this part of the head affords two well-proportioned arches, the lowest projecting, it is a certain sign of a good temperament and a sound understanding. All great and excellent men, we are assured, have been found to have their eye-bones firmly arched, and well defined; and circumspection, followed by stability, attends square foreheads, with spacious temples, and eye-bones of the above description. Deep indentures in the bones of the forehead, between the eye-brows, and extending in a perpendicular direction, mark the happy few who possess generous and noble minds, connected with excellence of understanding.

Lavater afterwards describes the characteristics which, he asserts, give 'the indubitable signs of an excellent, a perfectly beautiful and significant, intelligent, and noble forehead.' It must be one third of the face in length, or that of the nose, and from the nose to the chin; the upper part must be oval, 'in the manner of the great men of England,' or nearly square; the skin must be smooth, and wrinkled only when the mind is roused to just indignation, or deeply immersed in thought, and during the paroxysm of pain; the upper part must recede, and the lower project; the eye-bones must be horizontal, and present a perfect curve upon being observed from above; an intersecting cavity should divide the forehead into four distinct parts, but with that slight effect as to be only visible with a clear descending light: and all the outlines should be composed of such, that, if the section of one-third only is observed, it would be difficult to decide whether they were circular or straight. To conclude this portrait of a transcendant forehead, the skin must be more transparent, and of a finer tint than the remainder of the face. Should an infant, or relative, who possesses a forehead of the above description, seriously err, our physiognomist is assured that 'the latent seeds of virtue' may still be roused to growth, and will produce sooner or later the desired harvest. We have, at the hazard of prolixity, followed him through this doctrine of the forehead, that it may be duly compared with the discoveries so ably advocated in a portion of our article on PHRENOLOGY. We are quite captivated with the additional advantage of the discriminating 'wrinkles.'

Blue *eyes* are considered by Lavater to indicate weakness and effeminacy of character, yet he acknowledged that many eminent men have had blue eyes; still he was convinced that strength and manhood belong more particularly to the brown. Benevolence, tenderness, timidity, and weakness, are said to be exhibited by the perfectly semi-circular arch formed by the under part of the upper eye-lid; persons of acute and solid understandings have a generous open eye, composing a long and acute angle with the nose; and, when the eye-lid forms a horizontal line over the pupil, it is a strong indication that he who possesses it is subtle and penetrating. The compressed firm eye-brow, formed of parallel hairs, is a certain proof of profound wisdom, true perception, and a manly, firm habit of thought. There are eye-brows which meet across the nose; this circumstance gives the person an air of ferocious gloom, which is admired by the Arabs; but the ancients, versed in physiognomy, conceived such to be the characteristic of cunning: Lavater, on the contrary, observes, that he had discovered them on the most worthy and open countenances, admitting at the same time that they may denote a heart ill at ease. Those who think profoundly, and those equally prudent and firm in their conduct, never have high and weak eye-brows. Thick angular eye-brows, interrupted in their lengths, signify spirit and activity; and, when they approach the eyes closely, the more firm, vigorous, and decided, is the character. White eye-brows are demonstrative of weakness.

Of the *nose* he says, 'Its length should equal the length of the forehead; at the top should be a gentle indenting; viewed in front, the back should be broad, and nearly parallel, yet above the centre something broader; the bottom, or end of the nose, must be neither hard nor fleshy, and its under outline must be remarkably definite, well delineated, neither pointed nor very broad; the sides, seen in front, must be well defined, and the descending nostrils gently shortened; viewed in profile, the bottom of the nose should not have more than one-third of its length; the nostrils above must be pointed below, round, and have in general a gentle curve, and be divided into equal parts by the profile of the upper lip; the side, or arch of the nose, must be a kind of oval; above, it must close well with the arch of the eye-bone, and near the eye must be at least half an inch in breadth. Such a nose is of more worth than a kingdom.' Socrates, Lairesse, and Boerhaave, are admitted, however, to have been great men, who had ill-shaped noses.

Lavater expatiates on the *mouth* also with enthusiastic fervor; 'Whoever,' he exclaims, 'internally feels the worth of this member, so different from every other member, so inseparable, so not to be defined, so simple, yet so various; whoever, I say, knows and feels this worth, will speak and act with divine wisdom.' He then proceeds to call it 'the chief seat of wisdom and folly, power and debility, virtue and vice, beauty and deformity, of the human mind; the seat of all love, all hatred, all sincerity, all falsehood, all humility, all pride, all dissimulation, and all truth.'

The character is further proclaimed in the lips, the more firm the latter the more fixed the former; the weak and irresolute man has weak lips, with rapidity in their motion. The vicious, cringing, mean, and bad countenance is never formed with lips well defined, large, and justly proportioned to the other parts of the face, and the line of which is equally serpentine on each side; such, though they may denote a tendency to sensuality, belong exclusively to a character deserving of admiration. A mouth the lips of which are so thin as to present, at first view, little more than a line, is said to indicate apathy and quiet, but industrious when roused. When this description of mouth is raised at the extremities, vanity or vain pretensions, affectation, and probably deliberate malice, distinguish those so formed. The opposite of this kind of lips, swelled into considerable size, is a mark of indolence and sensuality. The 'cut through, sharp drawn lip,' as Lavater terms it, has to contend with avarice and anxiety. Lips closed accurately, without exertion, and handsome in their outline, belong to the exercise of discretion and firmness. Lips with the latter advantage, and the upper projecting, are generally appropriated to the virtuous and benevolent, though there are, without doubt, numberless persons of excellent character whose under lips project, but, in Lavater's opinion, the last peculiarity implies a well-meaning man, whose goodness consists rather of cold fidelity than ardent friendship. The under lip, hollowed in the middle, denotes a fanciful character. 'Though physiognomists,' adds Lavater, 'have as yet but little noticed, yet much might be said concerning the lips improper, or the fleshy covering of the upper teeth, on which anatomists have not, to my knowledge, yet bestowed any name, and which may be called the curtain, or pallium, extending from the beginning of the nose to the red upper lip proper. If the upper lip improper be long, the proper is always short; if it be short and hollow, the proper will be large and curved;—another certain demonstration of the conformity of the human countenance. Hollow upper lips are much less common than flat and perpendicular; the character they denote is equally uncommon. A mouth naturally falling open is indicative (naturally enough we should think) of a disposition to complain: the mouth remaining naturally closed of endurance and courage.

The projecting *chin* is said to mark something decided, and the receding the reverse. The presence or absence of strength is frequently demonstrated by the form of this part of the countenance. Sudden indentings in the midst of the chin are peculiar to men of excellent cool understandings, unless attended by marks of a contrary tendency; 'when the chin is pointed, those so formed are supposed to be penetrating and cunning. The chin, it is said, offers a certain criterion for the physiognomist, who may securely pronounce a large fat double chin an appendage of gluttony. 'Flatness of chin speaks the cold and dry; smallness, fear; and roundness, with a dimple, benevolence.'

It is scarcely to be supposed that modesty was very predominant in our author's physiognomy when he adds, 'No one whose person is not well formed can become a good physiognomist. Those painters were the best whose persons were the handsomest. Rubens, Vandyke, and Raphael, possessing three gradations of beauty, possessed three gradations of the genius of painting. The physiognomists of the greatest symmetry are the best. As the most virtuous can best determine on virtue, so can the most handsome countenances on the goodness, beauty, and noble traits of the human countenance, and consequently on its defects and ignoble properties. The scarcity of human beauty is the reason why physiognomy is so much decried, and finds so many opponents. No person, therefore, ought to enter the sanctuary of physiognomy, who has a debased mind, an ill-formed forehead, a blinking eye, or a distorted mouth.'

It has been correctly observed, however, that although the science has fallen into disrepute, there can scarcely be mentioned a period in which any cultivation of science took place when physiognomy was not likewise the study, nay, sometimes even the profession, of men of the most eminent abilities and the greatest learning.

PHYSIOLOGY.

PHYSIOL'OGY, *n. s.* Fr. *physiologie;* Gr. φυσις and λεγω. The doctrine or constitution of the works of nature.

Disputing *physiology* is of no accommodation to your designs. *Glanville.*

Some of them seem rather metaphysical than *physiological* notions. *Boyle.*

Philosophers adapted their descriptions of the Deity to the vulgar, otherwise the conceptions of mankind could not be accounted for from their *physiology*. *Bentley.*

PHYSIOLOGY, in its largest extent of signification, means the science of nature, compounded as it is of the words φυσις (nature), and λογος (a discourse). It is more usually, however, restricted to that department of physical knowledge which relates to organic nature exclusively; and indeed, when the word is used without any adjective specification, it is more usually limited to animal life, vegetable physiology being generally treated of as a separate branch of enquiry.

In compliance with these restricted views we shall consider the subject on the present occasion, and the article which we are now about to draw up will principally apply to the nature and functions of the human body; occasional illustrations will of course be introduced from the vegetable and brute creation; but organised living man will stand the prominent and particular object of our discourse.

The plan which we shall pursue will be, first, to treat of the properties of life generally, and afterwards consider the several faculties and functions which life in its highest state of exist-

ence unfolds to view. On some of these functions we shall be thought perhaps to dwell with disproportionate minuteness; but it ought to be recollected that as much curtailment as is consistent with explicit discussion must be necessarily aimed at, and that, although in an essay which professes to take in the whole circle of animate being it will be proper to recognise all its parts, some of the parts, in a work like ours, fall to be considered in other places, and that, therefore, such an amplification as would otherwise be due to the general enquiry would prove in the present case but useless repetition. Under the word BRAIN, for instance, and as a single illustration of our meaning, the reader will meet with matter which, but for the necessity of conforming to alphabetical arrangement, might have stood over for disquisition in this article.

Another reason may be given for the comparative brevity of the present paper, viz. that we propose to separate as much as possible physiological from anatomical investigation, conformably with the views pointed out under the article ANATOMY; and, although here and there it will be necessary to hint at structure as connected with function, yet we shall but with little exception suppose our readers to be acquainted with the anatomy of the organs whose properties and peculiarities we are about to trace.

On the very threshold of our argument we must, however, in some sort depart from this general principle and purpose; for it would be improper to engage in an investigation of living properties without calling the reader's attention to the fact that physiologists have ever been busy in endeavouring to ascertain the precise nature of organic compages, as it relates to ultimate structure; and in this endeavour one great difficulty immediately presents itself, viz. the impossibility of dividing the organic or living, from the inorganic or more material part of the organisation. Life as a property resides in or is diffused through the whole of an animated machine, and although there are some parts, as for example the hard substance of bone, in which vitality seems as it were at a lower ebb than in others, yet this perhaps is merely in appearance; for from the moment that organic properties are destroyed, even in bone, that bone ceases to be an integral portion of the body, to which hitherto it had been attached, and is no longer useful as portion and parcel of the body, but is separated and thrown off, either by the efforts of nature or the interposition of art.

And this leads us to remark on the great leading distinction between organic and inorganic matter; or, to employ phraseology which would be less obnoxious to objection, between organic existence and mere matter, which is indivisibility or mutual connexion of parts with the whole—a connexion which is displayed even in vegetable organisation; for a branch from a tree, equally with a limb from the body of an animal, ceases to exist as an organised being by itself, and soon upon separation becomes subjected to other laws than those of life. But this life, whatever it is, and we shall have a word or two further to say on this head in the course of our enquiries, is appended to or connected with, in some way or other, a material fabric, and the ultimate composition of this fabric has ever been a source of speculative enquiry.

Our forefathers in philosophy were contented with generalising the phenomena of nature under an elementary division of fire, air, earth, and water, and in a very vague way it must be owned applied these elementary principles to the explication of organised substances; thus the hardest parts, as the bones, they supposed to partake of the hardest of their elements, and by an admixture and different proportion of the other elements did they imagine the solids and fluids of living existence to be constituted. But even in the inanimate creation these elementary views have given way to a juster mode of philosophising, and it is now generally admitted that a confusion obtained among the ancient observers of nature, founded on their want of distinction between quality and substance, and by their assuming simplicity of existence, which further researches might and have proved to be compound—as in the case of air, which every tyro now knows to be any thing but a simple element.

We do not indeed feel quite sure whether some of our more modern physiologists have not been rather too forgetful of this impossibility of terminating our researches at a fixed point, when they have been anxiously endeavouring to trace organic existence up to its elementary sources; although it must be confessed that researches of this kind are in the present day pursued in a better spirit of philosophising, and under the general feeling that more and more of the works and wonders of nature may be unfolded to our view, as we multiply the means of our investigations, and do not go upon the assumption that we see every thing because a present horizon terminates our present views; that it is in the very nature of all material science to have no bounds; that we must avoid both giving laws and giving limits from our own imaginations, and be always careful to guard against confounding the notions of final and efficient cause, or of thinking of what we ought to see rather than of what we do see.

There is one very great difficulty connecting itself with our endeavours to unravel organised matter and trace it to its outward bounds, which arises from the circumstance of living existence being so completely an imperium in imperio. Thus, if we suppose a given structure, say of fibre, or to express the minuteness of the thing fibrilla, to be the principle in which all organised being is resolvable; we are impeded in this sweeping inference by the recollection that this very fibre is itself while part of the organised fabric necessarily made up of vessels and nerves—vessels to circulate blood through it and nerves to give it susceptibility,—that again these vessels and nerves must themselves be compounded of fibrous or of membraneous tissue,—and that thus they are mutually adinfinitum structurally, if we may so say, subservient to each other.

Having thrown out these intimations respecting the intricacies connected with the investigation of structural primordia, we shall now proceed to give the reader an insight into what modern endeavours have accomplished on this head, both

in the way of demonstration and inference; and we do not know that we can accomplish this task better than by copying the following very long note of Dr. Copland which he has appended to that part of Richerand's Physiology which refers to primary and essential structure.

M. Richerand very sensibly remarks that the simple or elementary fibre, about which so much has been written, may be considered as the philosopher's stone of physiologists. In vain, he says, Haller himself in his pursuit of his chimera told us that the elementary fibre is to the physiologists what the line is to the geometer; and that, as all figures are formed from the latter, so are all the tissues formed from this fibre; fibra idem physiologo est quod linea geometræ, ex qua nempe figuræ omnes oriuntur. The mathematical line is imaginary, and a mere abstraction of the mind, while the elementary fibre is allowed a material or physical existence. Nothing, therefore, can make us admit the existence of a simple elementary or primitive fibre, since our senses show us, in the human organisation, four very distinct materials. These materials Richerand in another place states to be cellular, nervous, muscular, and horny tissue.

Let the reader, however, bear in mind what we have just advanced in reference to the qualification with which even such divisions as these should be received or adopted; and with this recollection let him read attentively the following extract from Dr. Copland's valuable edition of Richerand, to which we have just referred.

'The intimate or elementary constitution of the animal texture has long engaged the attention of anatomists and physiologists. As researches respecting this subject can only be prosecuted by means of the microscope the results must therefore be received with some degree of reservation, unless they coincide with the observation of former enquirers or be confirmed by subsequent observers. From amongst those who have been engaged in this species of investigation J. F. Mickel is entitled to much confidence on account of his talents and industry; and the results of his labors claim particular notice, as they confirm much that has been recorded by former observers.'

According to the views of this physiologist the solids and fluids of the human body may be reduced to two elementary substances; the one is formed of globules, the other of a coagulable matter which either alone or united to the former constitutes the living fluids when it is in the liquid state, and gives rise to the solid tissues when it assumes a concrete form.

The globules present in their nature and aspect differences which are relative to the situations in which they are examined. They appear in the blood flattened, and composed of a central part, which is solid, and of an exterior portion, which is hollow and vesicular. Those found in the kidneys are smaller than those of the spleen, and the globules of the liver are still smaller. Those contained in the substance of the nerves present a less volume than those observed in the blood.

Globules exist not, according to Mickel, in the proper structure of the cellular tissues, of fibrous and cartilaginous parts, and of the bones. On the contrary, they abound in nerves and muscles, and determine their nature and color. Some of the fluids also, as the urine, contain no globules, whilst they are abundant in the blood, in the chyle, the lymph, the milk, &c.

During the first period of conception the mucous and homogeneous mass which constitutes the embryo contains no globules; it is not until a more advanced period that it is composed of two substances, the one fluid the other solid. These two elements seem to influence the form of the fibres and plates in which animal substances are disposed. The laminated tissues arise almost exclusively from the fluid matter. The fibrous tissues may also be produced from this matter alone, as in the tendons, &c.; they are, however, more frequently formed from the union of the globules with the concretive fluid, as may be observed in the nervous and muscular textures.

These observations of Mickel respecting animal organisation, it ought to be noticed, bear a near resemblance to the opinions entertained by Pfaff, who considered the elementary tissues to be formed from a series of molecules and globules, and to be different according to the presence and influence of the latter form of matter. The idea of a fluid substance capable of concretion is analogous to the opinion of the ancients respecting the substance denominated by them gluten. It is the cellular tissue, according to Mickel, which represents that substance; and in fact he regards this tissue as a species of concrete fluid, possessed of the properties already indicated.

It must, in our opinion, be admitted that the theory of Mickel possesses claims to a favorable notice. It is the result of observations which accord with those of others; it is also simple, and is easily to be reconciled with the phenomena which living texture presents.

Dr. Meyer of Bonn also considers that two kinds of elementary textures exist in animal bodies; the one is, according to him, composed chiefly of capillary vessels, and is formed from an assemblage of these vessels; under it he arranges cellular, serous, fibrous, and mucous tissues; the other possesses a proper and peculiar parenchyma, composed of globules, or of an organic pulp; such are the glands, the bones, the muscles, nerves, brain, and spinal chord. The first set of organs is a continuation, in his opinion, of the vascular system; while the second, on the contrary, is further removed from such a connexion. Foreign substances introduced into the circulation pass immediately and with rapidity into the former textures, while they either fail altogether in penetrating or insinuate themselves much more slowly, and after quite a different manner, into the parenchyma of the latter organs. The one class seems to appertain in general to the system of secretion; the other class of textures neither secrete from their individual influence, nor can they of themselves add to their nutrition. The first appears to be nourished by the immediate, rapid, and continual access of the fluid parts of the blood; the second by a slow and periodic disposition, and conversion into their proper substance of the sanguineous globules of the blood by means of the influ-

ence of the vascular extremities upon the blood which they contain.

The primary solids, or rather the elementary fibres of the human body, and of the higher classes of animals, cannot be considered with propriety to be more than three—the *cellular* or *laminar*, the *muscular*, and the *nervous*.

1. The *cellular* fibre is the most essential to animal existence, and is found in every individual of this kingdom. It consists of an assemblage of minute laminæ and distinct filaments. It is neither sensible nor irritable, and is chiefly composed of a nearly concrete gelatine.

2. The *muscular* fibre is not so generally distributed throughout the animal kingdom as the former, for it is not found in the zoophites.

3. The *nervous* or medullary fibre. The nature of this tissue has been the subject of, much investigation. M. de Bainville thinks that it originates in the muscular fibre, as this latter takes its origin in the cellular substance.

To these fibres professor Chaupier has added a fourth, namely, the *albugineous* fibre which is saline, white, and very strong; and is neither sensible nor irritable. The majority of anatomists, however, consider it as merely a very condensed cellular fibre

These fibres may be called the first order of the solids, as they serve to form all the other tissues and organs of the body. The cellular substance, for instance, is spread out and condensed into membranes, or rolled up in the form of vessels; muscular fibres also assume the form of membranes, concur to the formation of vessels, and constitute muscles; nervous fibres produce the nerves, &c. Finally, those primary solids associate in various forms, and give rise to the compound solids, as the bones, the glands, &c.; and even to those of a more complex nature, as several of the thoracic and abdominal viscera. Indeed every species of solid has for its base the cellular substance which is penetrated by nerves and vessels. The viscera, for example, are of this nature, having moreover a membraneous envelope. The bones also consist of a similar texture, and of a deposition also of phosphate of lime in their cellular substance.

Those primary solids, or most simple anatomical constituents which we have just now particularised, associate in various forms, giving rise to compound solids or tissues which are characterised not only by their form and nature, but also by the faculties which they perform.

These animal textures or compound solids were first arranged, with any degree of accuracy, by Richat; and however successful future researches into their ultimate nature may be, or whatever classification may be proposed by future enquirers, he is still entitled to the honor of having introduced a philosophical analysis into anatomical and physiological science. The arrangement of the tissues which this great man adopted is as follows:—the exhalant, absorbent, cellular, arterial, viscous, nervous of animal life, nervous of organic life, osseous, medullary, cartilaginous, fibro-cartilaginous, fibrous, muscular of animal life, muscular of organic life, mucous, serous, synovial, glandular, dermoid, epi-dermoid, and corneous or pilous system. Madelon has lately proposed another classification, possessing some advantages over that of Richat. He has reduced the number of textures, or systems, to twelve, viz. the cellular, nervous, osseous, cartilaginous, fibrou[illegible]ectile, mucous, serous, corneous or [illegible]l, and parenchymatous.

Professor [illegible] recently adopted a classification of the [illegible]res of compound solids, founded [illegible] respecting the elementary fibres or [illegible]lids. He recognises only seven systems [illegible] laminated tissue, 2d. the cellulo-fibrous tissue, 3d, the fibrous system, 4th, the cartilaginous tissue, 5th, the osseous tissue, 6th, the muscular fibre, and 7th, the nervous tissue.

The arrangement of this class of solids which we would propose is the following:—Employing the term tissue generally, we would divide the compound solids of the body into two classes, viz. general systems, and particular textures.

1. *General systems.*—Under this class we would arrange, 1st, the cellular system; 2d, the nervous system, which comprehends two orders, viz. A, the involuntary or ganglial order of nerves, or the system of the great sympathetic—and B, the voluntary order of nerves; 3d, the muscular system, which also embraces two orders, A, the involuntary order of muscular fibres: B, the voluntary order of muscular fibres; 4th, the vascular system; this system has four orders, viz. A, the arterial order of vessels; B, the capillary order; C, the venous order; D, the absorbent vessels, including, *a*, the lymphatics, and *b*, the lacteals.

2. *Particular textures.*—This class includes, 1st, the mucous textures; 2d, the serous textures; 3d, the fibrous textures, embracing the fibrous, the fibro-cartilaginous, and the dermoid; 4th, the cartilaginous textures; 5th, the osseous textures; 6th, the orictile textures; 7th, the glandular textures, including the parenchyma of the viscera; 8th, the corneous textures, embracing, A, the pilous, and B, the epidermoid textures.

Proceeding synthetically, we may arrange all the solids of which the animal body is composed after the following manner:—

Class 1st, or *Elementary animal solids.*

The cellular fibre.	The nervous fibre.
The muscular fibre.	

Class 2nd, *Secondary* or *Compound animal solids.*

Order I.—General systems.

The cellular system, including the adipose tissue.	The nervous systems.
	A. The involuntary or ganglial order of nerves, or system of the great sympathetic.
	B. The voluntary order of nerves.
The muscular system.	The vascular system.
A. Involuntary muscles.	A. Arterial vessels.
B. Voluntary muscles	B. Venous vessels.
	C. Absorbents.
	a. Lymphatic absorbents.
	b. Lacteal absorbents.

Order II.—Particular textures.

Mucous textures.	Serous textures.
Erectile textures.	Fibrous textures.
	A. The fibrous.
	B. Fibro-cartilaginous textures.
	C. Dermoid textures.
Glandular textures.	Corneous texture.
Cartilaginous textures.	A. The epidermoid.
Osseous textures.	B. The pilous.

Class 3d, *Associated, or complex animal solids.*

Order I.—Organs of nutrition.

Digestive organs.	Organs of absorption and circulation.
Organs of respiration and assimilation.	Organs of secretion and animal heat.

Order II.—Organs of relation.

Organs of sensation.	Organs of voluntary motion.

Order III.—Organs of reproduction.

Organs of generation in both sexes.

We have made this long extract from Dr. Copland, because we think it presents as concentrated a view as any we have met with respecting the labors of physiological analysts in reference to ultimate structure. It will be afterwards seen, when we are upon the nervous system, as indeed the above extract intimates, that Dr. C. is partial to those views which regard the primordia of all the textures to be a globular formation. This view (and some of his intimations deserve the credit of novelty as well as ingenuity) has been taken up in different ways by other physiologists, especially by Dr. Edwards of Paris, but still more recent investigators have questioned the accuracy of Dr. E.'s inferences, and indeed the whole business of ultimate or primordial organisation is exceedingly obscure, or but dimly seen, and that partly from the causes we have already pointed out.

But as well on the head of properties as construction opinion is in some measure different, although part of the diversities, as we shall immediately see, depends upon the difference of signification which is affixed to terms.

It will be recollected we stated above that the grand distinguishing feature of life is indivisibility or totality, or, as it may be expressed, mutual connexion and dependence of one part upon another. Break a stone into two equal fragments, and each part preserves the same identity as before the division—not so with substance that is organised; for in this last a connecting or central principle exists which is destroyed by separation, and the separated parts—parts separated from the centre—immediately lose their organic properties, and become subject to new laws. It may be said that an exception obtains to this law in some of the zoophites and vermes; but there is no point of fact, no exception even in these examples, because, in cases where life is preserved after separation, the being thus treated may be considered either as a series of beings each having its own central vitality, or to be so low in the scale of organisation as to be only admissible as a connecting link with the inorganic world.

This principle of indivisibility has been well expressed we believe by Richerand in the following words:—'The mode of existence in living bodies resides in the whole, while each part of inanimate matter belongs to itself.'

Setting out then with a recognition of this leading characteristic of organisation, we are further to enquire into the fundamental properties which organisation manifests. We must premise that the usual divisions of organised beings is into animal and vegetable; the former possessing those faculties from which result sensation and loco-motion, the latter being destitute of such faculties. Some indeed have supposed that this division is untenable, and that wherever there is organisation there is some sort of sensation, or rather of sensibility; but it is not within our present province to enter into this question, since it is only animal physiology with which we are now to be engaged.

Now a faculty to which the word irritability has been appropriated is decidedly a faculty of organisation exclusively; it is the power or property of contracting upon the application of certain excitants or stimuli; but with this excitation there is often a simultaneous consciousness of the effect, and in that case the physiologist says there is another faculty brought into exercise, namely, sensibility. And so far there is no difficulty; but this last power or property, besides being different in different parts and in different circumstances of the individual so as to vary in degree and in kind, is often manifested in such sort as that the parts and organs implicated seem to have perception without that perception calling forth consciousness; and it hence becomes a question whether this faculty belongs to irritability or sensibility, or rather by what term it should be designated.

It should seem, says Richerand, that no part of the body can do without a species of sensibility, which is absolutely necessary for life. Without it how could various organs act upon the blood to draw from it the means of their nutrition or materials for the different secretions? Therefore this degree of sensibility is common to every thing which has life, to animals and vegetables, to a man when asleep and awake, to the fœtus and the infant, to the organs of assimilating functions, and to those organs which put us on a level with surrounding beings. This low degree of sensation could not have been sufficient for the existence of man, and of beings resembling him exposed to numerous connexions with every thing that surrounds them; therefore they possess a sensibility far superior, by which impressions affecting certain organs are perceived, judged, compared, &c. This sort of sensibility would be more properly called perceptibility, or the faculty of judging of the motions experienced. It requires a centre to which the impressions have a mutual relation; therefore it only exists in animals which like man have a brain, or something equivalent in its place; whilst zoophites and vegetables, not possessing this central organ, are both destitute of this faculty; however po-

lypi, and several plants, as the sensitive, have certain spontaneous motions, which seem to indicate the existence of volition, and consequently of perceptibility; but these actions, like that of a muscle from the thigh of a frog excited by the galvanic stimulus, are occasioned by an impression that does not extend beyond the part itself, and in which sensibility and contractility exist in a confused state.

Perhaps volition is the best test of these kinds of susceptibility; yet volition has some power over the organic functions, as in the instance of respiration; and the increase of sensibility on some occasions under disease adds to the difficulty of defining and separating it according to its grades. Richerand imputes our want of consciousness of impressions upon our organs by the animal fluids to our being accustomed to them, as is to be observed in vision, hearing, smell, taste, and feeling, which cease to be excited by stimuli to which they have been long accustomed. But, if this be the cause, surely the sensibility must have been intolerable before it began to operate: at the moment of birth it must have been beyond endurance. Is it not more probable that this want of consciousness proceeds from the nature of involuntary living action? Is not the sensibility in question an intermediate faculty between that which gives sensation and volition and that upon which muscular irritation and contraction depend? In a galvanised frog there can be no perception; for (as Cuvier observes) the possession of sensation by these fragments cannot be reconciled with our consciousness of the unity of our being, although the actions are excited through the medium of nervous susceptibility, and are of a different nature from those which would follow a mere irritation of the muscular fibre. May we not then infer that the nervous organisation is endowed with a susceptibility independent of what M. Richerand perhaps improperly calls percipient sensibility; and that it is through the medium of this faculty that the incessant and unperceived performance of the vital functions is accomplished? When the voluntary faculty ceases to acknowledge its appropriate stimuli; when sensation for a time is suspended, as in apoplexy, or in experiments on frogs by pouring opium on the brain of these animals; the vital functions are still kept going on by means of the susceptibility to which we now refer. Convulsive action, whether occurring in the voluntary or involuntary muscles, seems to result from an unhealthy condition of this nervous susceptibility, which, in instances of sudden death, produced by an abrupt abolition of the sentient and loco-motive faculty, for some time longer lingers in the system, deranged, indeed, but not yet destroyed, and produces those spasmodic motions which are observed in an animal body under the circumstances which we are now supposing. When, for example, a domestic fowl is deprived of life, either by its head being severed from its body, or by the more usual mode of screwing the neck, a spasmodic or convulsive kind of vellications will be observed, and indicate the remains of this susceptibility for some time subsequently to the departure of actual sensibility. In the case of articulated worms a like separation of parts does not seem to operate the same immediate destruction of the sensitive and locomotive faculty; for as, in them, there is no single brain, but ganglia as the centres of sensation and volition, each part of a divided worm is thus, as we have above remarked, a distinct sentient being. From the remains of this principle may originate those convulsive affections which almost invariably precede death in the course of nature, and which are often manifest in a violent degree for some time after the departure of the sentient or perceiving faculty; but which is itself destroyed prior to the total destruction of muscular irritability, or the vis insita of Haller. This last property is denominated by the moderns contractility, and is generally supposed to exist rather in the muscular than nervous tissues. The general organ, says Cuvier, of motion, is the fleshy or muscular fibre. This fibre contracts itself by volition, but the will only exercises this power through the medium of the nerves. Every fleshy fibre receives a nervous filament, and the obedience of the fibre ceases when the communication of that filament with the rest of the system is cut off or interrupted. Certain external agents applied immediately to the fibre likewise cause contractions, and they preserve their action upon it even after the section of its nerve, or its total separation from the body, during a period which is longer or shorter in different species of animals. This faculty of the fibre is called its irritability. Does it in the latter case, continues Cuvier, depend upon the portion of the nerve remaining in the fibre after its section which always forms an essential part of it? or is the influence of the will only a particular circumstance, and the effect of an irritating action of the nerve on a faculty inherent in the muscular fibre? Haller and his followers have adopted the latter opinion, but every day seems to add to the probability of the opposite theory.'

Those of course who follow this theory would conceive, as very many do conceive, that the nervous and muscular tissues are modifications of one simple structure, while the followers of Haller regard muscle and nerve as, ab origine ad finem, distinct organisation; and these last suppose that the nerves are mere instruments for developing contractility in the muscular fibre, which contractility is capable of being exhibited without the interposition of nerve at all. Many plants are possessed of contractile, though not as it would appear of sensitive, or proper sensitive, or loco-motive power; this contractility, from the mode of its excitation and from the phenomena which it exhibits, has been thought to be the same with the irritability of the animal fibre, although neither brain nor nerves have yet been detected in vegetables. In opposition, however, to the muscular doctrine, if so we may term it, some have questioned the existence of muscular fibre as a distinct tissue. M. Delametherorie, a French physiologist, who wrote some few years since, carries this principle or assumption to the extent of denying altogether muscular construction, and states that the substance which has been ordinarily considered muscle is merely a congeries of blood vessels, lymphatics, and nervous filaments, bound toge-

ther by cellular membrane, in the intervals of which are deposited animal gelatine and fat, and many since his time have reasoned upon the same assumption.

Irritability itself, on the other hand, has been divided into two species: the one has been named by some physiologists tenacity, the other musculosity; but perhaps the difference would rather refer to the variation of susceptibility to excitant than any thing otherwise specific; the slow, gradual, and tonic, action of the bladder in expelling the urine, to which we may probably add the power which conveys the blood the round of circulation after it has lost the influence of the heart's action, seems principally to vary from that of the voluntary muscles by being more beyond the influence and caprices of the will.

Irritability and sensibility, whether distinct faculties or modifications of the same property, are developed and excited by peculiar and respective agents, even where the structural arrangement of parts would not point out any variation. Thus, light is a stimulus to the eye, sound to the ear, a sapid body to the taste, and an odoriferous body to the smell. Thus mercury will excite the hepatic foxglove, the renal viscus, although in each instance the indivisible faculties of sensibility or irritability are called into play; and no difference indicating peculiar excitability can be traced by the anatomist in the arrangement, or the chemist in the composition of the ultimate fibrillæ, constituting either the nerves or the contractile organs of the respective parts. This circumstance, as we shall afterwards see when treating of the circulation, is laid hold of as an argument in favor of the independent power of blood-vessels in the way of contractile propulsion, although their proper muscularity is denied by those who regard them as mere regulators of, not efficient organs in, the circulatory impulse.

The animal frame is thus altogether supported partly in the same manner as a piece of complicated machinery, composed of several springs, each of which is kept in exercise by a principle peculiar to itself, while the effect of them all together is one resulting whole; produced and maintained by one prime and constantly operating principle—the vitals.

Now researches into the nature, and essence, and cause of this principle have been characterised, even up to the present day, by a great deal of misconception as to the very nature and object of philosophising. One party, as we have remarked in another place, advocating the doctrine that organisation, or a certain mode of putting together the particles or molecules of which an organised substance is composed, is the principle upon which vitality is produced; while another contends that this vitality is a something—a subtile something—appended to matter, seemingly forgetful that such something, however subtile, must, to come within the cognizance of our ken, be itself matter; for man never has had, nor can have, any notion of the mode of that existence which is named spiritual in opposition to material. The opponents, then, of the organic theorists, are in reality more decidedly materialists than are those against which their arguments and invectives are directed; and although when the organist means to say that every thing connected with life, from the mere lowest grade of sentient manifestation up to the highest degree of intellectual and moral being, is the result of bodily construction, and that, therefore, the materials of which the body is composed are the ultimatum of every thing in thought and act; when, we say, the organologist reasons and infers from these premises, and in this manner, and to this end, his inferences are wide of the truth, and his principles most decidedly at variance with all that is seen and known respecting volition and responsibility. But we must contend that the appending philosopher, if so we may term him, makes the matter worse, and forgets that, even upon his own showing, he is giving immortality and perpetuity of existence to the meanest reptile that crawls upon the earth.

No one can question that life exhibits an order of truths peculiar to itself, and which is nowhere to be found beyond the sphere of living existence; but we should always recollect that it is the province of physical reasoning not to imagine, but to infer; and when we observe that this same life, in all its modifications and stages, requires for its development and maintenance the incessant agency of peculiar powers, and matter peculiarly constructed, we are not merely justified in concluding, but we are compelled to the inference, that the combinations of effects to which we have applied the term life are connected with such agency and such organised matter. The nature of the link which constitutes this connexion must ever in one sense be concealed—that is, the why and wherefore it is brought about;—but the connexion itself is sufficiently evident, and all our knowledge, after discoursing and disputing to the end of time, must terminate in the result of observations on the laws, not in finding out the essence, of vitality: a proposition this which one should think sufficiently plain and perspicuous, but if it had been received and properly acted upon would have saved the press the labor of volume upon volume of unmeaning controversy.

But to revert briefly to the subject of this introductory disquisition: We have first seen that there is considerable intricacy attached to the question respecting the material elements which enter into the composition of an organised body—that some have supposed the primordial elements to be globular—that some have opposed this assumption, and that much of ingenuity but nothing absolutely satisfactory has been shown by physiologists in their investigation of the elements of bodies. We have all along assumed that there is a great leading distinction between animate and inanimate, or organised and dead matter, in the one depending for its totality of existence upon some central principle, while the other has a sort of independent being, one fragment of dead matter being the same in quality as the mass from which it has been broken. It has been remarked further that when we come to trace the differences in the degrees of this organising principle through vegetable and animal

life, that we find difficulty in the distinction between mere susceptibility and positive sensibility; but that perceptibility and irritability, and volition, are clearly distinct powers or faculties, the difficulty lying principally in the necessity we are under often of assuming sensibility in a sort of latent form or without consciousness on the part of the individual in whom it is called into being.

On this last particular we may have a word or two more to say when we are upon the subject of the *sensations*; we now proceed to treat of the functions peculiar to life, and in so doing we shall follow generally the arrangement proposed and adopted by Richerand, which appears to us the most philosophical and satisfactory scheme that has been contrived. Here and there we shall deviate from the arrangement; but when we do so the reason for the change will we imagine be sufficiently obvious to the reader.

Classification of the functions of life.

- Class I. Functions which serve for the preservation of the individual (individual life.)
  - Order 1st. Functions which assimilate the aliment by which the body is nourished (assimilating, internal, or digestive functions).
    - Genus 1st. *Digestion* extracts the nutritive part.
      - Reception of the food.
      - Mastication.
      - Solution by the saliva.
      - Deglutition.
      - Digestion in the stomach.
        - duodenum.
        - intestines.
      - Excretion of the fœces and urine.
    - Genus 2nd. *Absorption* carries it into the mass of humors.
      - Inhalation of chyle.
        - lymph.
      - Action of vessels.
        - glands.
        - the thoracic duct.
    - Genus 3d. *Circulation* propels it towards the organs.
      - Action of the heart.
        - arteries.
        - capillary vessels.
        - veins.
    - Genus 4th. *Respiration* combines it with atmospheric oxygen?
      - Action of the parietes of the thorax.
        - lungs.
      - Alteration of the air.
        - in the blood.
      - Disengagement of animal heat.
    - Genus 5th. *Secretion* causes it to pass through several modifications.
      - Exhalation.
      - Secretion by follicles.
        - glands.
    - Genus 6th. *Nutrition* applies it to organs to which it is to supply growth and restore their loss.
      - Different in every part according to the peculiar composition of each.
  - Order 2nd. Functions which form connexions with surrounding objects (*external* or *relative functions*).
    - Genus 1st. *Sensations* inform the being of their presence.
      - Organs of
        - the sight.
        - hearing.
        - smell.
        - taste.
        - feeling.
      - Action of nerves.
        - the brain.
      - Human understanding.
      - Sleep and watching.
      - Dreaming and sleep-walking.
      - Sympathy.
      - Habit.
    - Genus 2nd. *Motions* approach towards or remove it from them.
      - Organs and muscular motion.
      - The skeleton.
      - Articulations.
      - Place.
      - Progressive motions
        - Walking.
        - Running.
        - Jumping.
        - Swimming.
        - Flying.
        - Creeping.
    - Genus 3rd. The *voice* and *speech* cause it to communicate with similar beings without change of place.
      - The voice
        - Articulated, or speech.
        - Modulated, or singing.
      - Stammering.
      - Lisping.
      - Dumbness.
      - Ventriloquism.

Class II. Functions which serve for the preservation of the species (life of the species.)	Order 1st. Functions which require the concurrence of both sexes.	*Conception and generation.*	General differences of the sexes Hermaphroditism. Systems relative to generation.
	Order 2nd. Functions which belong exclusively to females.	*Gestation.*	Of the uterus in a state of impregnation. History of the embryo fœtus and its membranes.
		Delivery.	Of the uterus after delivery. The lochiæ.
		Lactation.	Action of the breasts. Milk.
		Growth.	Infancy—dentition—ossification. Puberty—menstruation. Adolescence. Youth.
		Virility	Temperament. — Sanguine. / Muscular. / Biliary melancholic. / Lymphatic. / Nervous. Idiosyncracy. Human race. — European. / Negro. / Mongol. / Hyperborean.
		Decrease.	Age of decrease. Old age. Decrepitude. Death. Putrefaction.

After presenting his readers with the above table of classification, and giving his reasons for its adoption, M. Richerand goes on to observe very properly that too much importance should not be attached to it, being like all others purely hypothetical. All is connected together; all is co-ordinate in the animal economy; the functions are linked together and depend on one another, and are performed simultaneously; all represent a circle in which it is not possible to mark the beginning or the end. In circulum abeunt.—Hippocrates. In man, while awake, digestion, absorption, circulation, respiration, secretion, nutrition, sensation, motion, voice, and even generation, may be performed at the same time; but whoever, in the study of the animal economy, should bestow his attention on this simultaneous exertion of the functions, would acquire but a confused knowledge of them.

'I might,' adds our author in another part, 'have begun by a view of the external functions as well as those of assimilation or nutrition, of sensation or of digestion. I have given preference to the functions of assimilation because of all others they are the most essential to existence, and their exercise is never interrupted from the instant in which the embryo begins to live, till death. In beginning with an account of them we, therefore, imitate nature; who imparts to man this mode of existence before she has connected him with outward objects, and who does not deprive him of it until the organs of sense, of motion, and of the voice, have completely ceased to act.

As in one particular we shall deviate from our author's arrangement, viz., in considering the voice immediately after the respiratory function, it may not be amiss before we commence to let M. Richerand state in his own words his reason for separating these functions; which, although there is some degree of force in it, does not, we confess, appear to us sufficiently powerful to authorise the separation.

'As to the course,' says M. Richerand, 'which has been followed in the arrangement of the functions that belong to the same order, or which concur in the same end, it was too well laid down by nature to permit us to depart from it. I have thought it right that the consideration of the voice should immediately precede that of generation, in order that the arrangement might at a glance show the connexion that exists between their phenomena. Several animals use their voice only during the season of love; the birds which sing at all times have, during that period, a more powerful and sonorous voice. When man becomes capable of reproduction his vocal organs suddenly become evolved, as though nature had wished to inform him that it is through them he is to express his desires to the gentle being who may sympathise in them. The voice, therefore, serves as a natural connexion between the external functions and those which are employed in the preservation of the human species.

'The voice, which leads so naturally from the functions which establish our external relations to those whose end is the preservation of the species, is still more intimately connected with motion. It is, in a manner, the complement of the phenomena of loco-motion; by means of it our communication with external objects is rendered easier, more prompt, and more extensive; it depends on muscular action, and is the result

of voluntary motion. Finally, these motions sometimes supply the place of speech, in pantomime for example, and in the greater number of cases the language of action concurs in adding to its effect. Every thing, therefore, justifies us in placing this function after motion, in separating it from respiration, with which every other has joined it, without considering that the relation between the voice and respiration is purely anatomical, and can, therefore, in no wise apply to physiology.'

Of Digestion.

Under this head it will be seen, by reference to the table, are included the reception of the food, mastication, solution by the saliva, deglutition, digestion in the stomach, in the duodenum, and in the intestines, and lastly, the excretion of the fœces and urine. This order then we shall pursue, and these several particulars we shall include while treating on the digestive process; and we shall have to speak of the pancreatic secretion, of the bile, of the spleen, and omentum as auxiliaries or subsidiaries to the function in question.

The food received by the mouth is masticated or ground down by the teeth, which are so constructed in man as to be equal to the tearing or grinding down of both vegetable and animal substances. The canine, or as Richerand calls them, laniary teeth, are for the purpose of dividing hard substances, and it is by these principally that man is proved to be naturally carnivorous; the cuspid serve for the biting off small pieces; while the molares or grinding are those by which the act of mastication is mainly performed, after the morsel has been torn off by the laniary teeth, and as it were cut through by the cuspid.

In this process of mastication the lower jaw is principally brought into action, which is so connected with the skull as to admit of easy motion, while the articulation is at the same time very strong; 'its condyles are prevented from descending very deeply into the glenoid cavity, and thus being confined to vertical movements, by a cartilage which is hollow on each surface, and moveable, and permit the condyle to move from the glenoid cavity to a tubercle which stands before this, and thus to acquire still greater mobility.' We find, however, in some instances of opening the mouth exceedingly wide, as in gaping or singing, that dislocation here occurs, though very rarely, the condyles slipping under the zygomatic arches.

Now during this movement of the lower jaw, and the manducation by the teeth, a flow of saliva is occasioned from the salivary glands, being mechanically and otherwise excited into action, and thus is the food further acted upon by this secretion, which during the process becomes mixed with mucus of the labial and buccal glands, and the moisture which comes from the soft parts of the mouth. The food thus prepared is pressed by the tongue against the roof of the mouth, which 'turning its tip upwards, and backwards, at the same time that its base is depressed, there is offered to the food an inclined plane, over which the tongue presses it from before backwards, to make it clear the isthmus of the fauces, and to thrust it into the œsophagus.' The following is the account which Blumenbach gives of the mechanism of deglutition:—'The tongue being drawn towards its root, swelling and growing rigid, receives the bolus of food upon its dorsum, which is drawn into a hollow form. The bolus is then rolled into the isthmus of the fauces, and caught with a curious and rather violent effort by the infundibulum of the pharynx, which is enlarged and in some measure drawn forward to receive it. The three constrictor muscles of the pharynx drive it into the œsophagus. These motions are all performed in very rapid succession, and require but a short space of time. Nature,' he goes on to say, 'has provided various contrivances for opening and securing this passage. The important motion of the tongue is regulated by the os hyoides. The smallest particle of food is prevented from entering the nostrils, or Eustachian tube, by means of the soft palate, which, as well as the uvula suspended from its arch, and whose use is not clearly understood, is extended by muscles of its own, and closes those openings. The tongue protects the glottis; for the larynx at the moment of deglutition is drawn upwards and forwards, and in a manner concealed under the retracted root of the tongue, and applied to the latter in such a way that the glottis, being also constricted and protected by the epiglottis, is most securely defended from the entrance of foreign substances.' We may remark, by the way, that there is some obscurity with reference to the epiglottis; for it seems that, as Dr. G. states in a note on Blumenbach, the glottis may be closed sufficiently, independently of the epiglottis. We have been informed that the celebrated tragedian Mr. John Kemble was without an epiglottis, and Dr. Magendie states that 'he saw two persons perfectly destitute of epiglottes, who always swallowed without difficulty.' Targioni also, we are told, met with one, and in that case neither deglutition nor speech was impaired.

Passing thus over the glottis, the food is received into the œsophagus, through which it is propelled into the stomach, not by its specific gravity, but by the contraction of this membrano-muscular canal; for although, as it has been observed, weight is no obstacle to the food passing through the œsophagus into the stomach, yet it has so little to do with it 'that the diminution of the muscular contractility at the approach of death is sufficient altogether to prevent it. The act of drinking is then attended with a noise of unfavorable omen. This noise consists in the gurgling of the fluid, which has a tendency to get into the larynx, whose opening is not covered over by the epiglottis; and if the attempt to swallow be persevered in, or if the by-standers insist upon getting some fluid down the throat, the deglutition of which is impracticable, it flows into the trachea, and the patient dies of suffocation.'

The mass thus prepared by manducation, and by the fluids to which we have referred, is now received into the stomach, and here it becomes subjected to the influence of a secretion, which seems to be constantly poured out from the inner surface of the organ, and which fluid is named

the gastric juice, the nature of which, and the purposes it reserves in the digestive process, we are immediately to observe upon.

How, it may be asked, does this secretion apply itself to every portion of the injected material, since the fluid is only of course poured out from the membrane of the stomach itself, and unless it be supplied in sufficient quantity to penetrate the whole of the mass as it passes through the viscus, it might be expected that some, and indeed the greater portion of the ingesta would pass on to the outward, or pyloric extremity of the stomach, unaffected by the gastric secretion? But it has been shown, by the experiments of Dr. Wilson Philip, that the layer of the food next the surface of the stomach is first digested, and in proportion as this undergoes the proper change, and is moved on by the muscular action of the stomach, that next in turn succeeds to undergo the same change. 'There is something,' says Dr. Uwins in his recent Treatise on Stomach Affections, 'exceedingly interesting in the mode by which this successive application of portions of food to the surface of the stomach is effected. It is indeed brought about by virtue of that peculiar action which is called peristaltic, and which extends down the whole line of the intestines. When I first read Dr. Philip's remarks on this particular in his work on indigestion, I conceived them to be as novel as they are interesting, and I still believe Dr. P. to have been quite unconscious of having been anticipated; but, in looking over some old works on the subject of digestion, a friend of mine found a statement in a thesis bearing the date of 1715 which is almost verbatim the same with that of Dr. P.' We have consulted the treatise to which allusion is here made, and find, as it is stated, that Dr. Philip's account of the process is almost a translation of the Latin. But Dr. P. was doubtless ignorant of this curious anticipation of his very interesting discovery.

Blumenbach expresses himself in the following manner, in reference to the rationale of digestion. 'This very important function is probably assisted by various accessory circumstances. Among them some particularly mention the peristaltic motion, which, being constant and undulatory, agitates and subdues the pultaceous mass of food. The existence of a true peristaltic motion in the stomach during health is not however quite certain: indeed the undulatory agitation of the stomach that occurs appears intended for the purpose of driving the thoroughly dissolved portion downwards [onwards], while those portions which are not completely subacted are repelled from the pylorus by an anti-peristaltic motion.' So that here we have in some measure an announcement of the same principle as that of Dr. P., but to this last individual the credit is undoubtedly due of establishing, by a series of well conducted experiments, the precise mode in which the part of the food acted on by the gastric juice is pushed on towards the pylorus, and other portions take its place to be treated in the same manner. It is said that during healthy digestion the chyme passes the pylorus in between three and six hours after meals.

Having passed this orifice of the stomach it has now arrived at the duodenum, and it may be right to state that there is a peculiarity in the construction, position, and office of this the first of the intestines, which together constitute it a sort of second stomach; it is in the first place more fixed in its place than the other portions of the intestinal tube, and here too the chyme is acted on not only by the secretions from the internal surface of the gut, but by the bile and pancreatic fluid, both of which are received into the duodenum.

From the duodenum the mass is continued along the course of the small intestines by a true peristaltic impulse, by which a sort of vermicular motion is occasioned, and through which the gradual propulsion is effected. At the commencement of the large intestines the reader conversant with anatomy knows that there is such a construction of the canal as to facilitate a third detention of the mass, and to prevent any return of it into the smaller intestines; here it is that the fæcal character commences upon the ingesta, for the food by this time has lost a great deal of its nutritious portion, and it is the office of the large intestines to receive and separate and expel this excrementitious portion. And, whatever disarrangement may take place in the stomach or bowels, no fæcal matter can be returned into the upper division of the intestinal canal, unless the valve at the ideal head of the colon have lost its muscular power.

Such then is briefly the digestive organisation. We have first the mouth for the reception of the food, the teeth and motion of the jaws for manducation, the salivary secretion, and the curious construction of the pharynx and glottis for propelling the mass into the stomach. We have next the stomach for subjecting the mass to the agency of the gastric juice. We have thirdly its passage into the duodenum, its further retention there, and the reception into this gut of the biliary and pancreatic secretion. The mass from the duodenum is propelled slowly on by peristaltic action through the convolutions of the jejunum and ileum, and from the inner surface of these last it is that those innumerable chyliferous vessels take up the nutritious portion of the food and convey it into the blood, while the effete part passes on through the valve of the colon; here it becomes more thoroughly excrementitious, and is at length, still by the peristaltic or vermicular motion of the gut, transmitted to the rectum to be discharged by the anus, when the sphincter or retaining power of that gut is solicited to give way by the quantity or stimulus of the contained fæces.

But it behoves us to stop and enquire a little further into the nature of the respective changes produced upon the aliment in the mouth, in the stomach, in the duodenum, and its passage through the intestinal convolutions.

That saliva in the first instance operates a considerable change upon the masticated mass is sufficiently evident, and it is curious to observe that the very action which communicates the food excites to the secretion of the salivary glands. Here then the first change is effected, but of its precise nature we want perhaps further observation and experiment to satisfy us.

For the chemical composition of the saliva the reader is referred to the article CHEMISTRY; it may be here just stated that it has a strong affinity for oxygen, and it has been suggested that an absorption of that principle takes place during mastication, so as to assist in the changes which the alimentary mass is destined to undergo. It has, however, been justly remarked that the absorption of oxygen by this fluid, during the process of mastication, has not been sufficiently attended to in our speculations respecting the process of digestion. We can hardly suppose that it takes up oxygen without a portion of nitrogen or common air; and if any quantity of the latter be mixed with it during the insalivation of the food an evident source is disclosed, from which nitrogen may be conveyed into the circulating fluids in addition to that which is derived from the ordinary aliments. The importance then of the salivary secretion in aid of the digestive process is easily conceivable; and, although pathological and practical intimations are somewhat out of place in a treatise on pathology, we may just stop to say that due mastication of the food is not merely of consequence from the division of its parts into small fragments, but that it is also important inasmuch as it gives time and opportunity for the admixture of the saliva with the communicated mass; and that therefore persons who are in the practice of fast eating deprive their stomachs of one of the assistants which nature has provided.

But what is the absolute nature of the influence which the gastric juice effects upon the ingested material? It was once supposed that a species of fermentation constituted the principle of the digestive action; trituration also was conjectured especially by the mechanical physiologists to operate the effect; and to such an extent was this assumption carried that Dr. Pitcairn suggested the food to be ground down with a pressure equal to the weight of not less than 170,000 lbs., assisted at the same time in its gigantic labor by an equal pressure derived from the surrounding muscles. Maceration, putrefaction, concoction, have all at different times been proposed as principles of the digestive process, but all in the most vague manner, and without a due recognition of the fact that what takes place under the guidance of vitality does not require or admit of analogies from other departments of nature in an abstract manner. John Hunter used to settle this matter in a laconic but satisfactory way: 'The stomach, gentlemen,' he was wont to say while addressing his pupils, 'has been held by some to be a mill, others will have that it is a fermenting vat, others that it is a stew-pan; but in my view of the matter it is neither a mill, a fermenting vat, nor a stew-pan, but a stomach, gentlemen, a stomach.'

It is now pretty generally allowed that the conversion of food into chyme (the name given to the pulpy mass which is projected into the duodenum) is principally effected by the solvent and coagulating power of the gastric secretion; but even this solvent energy is of a sui generis character, and does not admit of close comparison with solution effected out of the body. The coagulating quality of the secretion is evinced by its effecting this change upon milk that is taken into the stomach; but this coagulated mass is soon redissolved and commingled with the other portions of the chyme. The solvent power indeed of the gastric secretion is so great, that under some circumstances the coats of the stomach have been corroded by it. It was the opinion of Mr. John Hunter, however, that such a fact can never take place except in cases of sudden death, when the stomach is in full health and the gastric secretion now just poured forth is surrounded by a dead organ; for he argues plausibly that, so long as the stomach is itself alive, it is capable by its living principle of counteracting the effect of this solvent power, a power so great that handles of clasped knives have been found half digested, and their blades blunted in the stomach, and pieces of the toughest meats and of the hardest bones enclosed by Dr. Stevens in perforated balls, and thus necessarily uninfluenced by any action of the stomach itself, were eventually broken down and dissolved by the contact of the gastric secretion.

It is generally allowed that besides this solvent and peculiar agency of the gastric secretion itself, digestion or conversion into chyme of the ingested mass is assisted by pressure on the stomach from the alternate motion of the abdomen, and the high temperature of the parts. We all know how material an aid to the digestive functions exercise proves, and this could not be the case were the conversion of the food into chyme merely consequent upon the solvent agency of the gastric fluid, unless indeed we might suppose that the exercise influenced by increasing this secretion, and thus only in an indirect manner contributing to the effect. While exercise thus contributes to the digestive process when taken at proper times and in due degrees, we must recollect that rest and certain positions on the other hand favor the due conversion of the food into chyme. If a person makes violent exertions, or takes a recumbent position immediately upon eating, digestion does not go on with so much ease as if he refrain from exercise and sit in an upright or only in an inclined posture. M. Richerand, in remarking on the observation that during sleep digestion takes place much more readily when we lie on the right than on the left side, states that this has been ascribed to the compression of the liver on the stomach, but that it is much more likely to depend on the circumstance that when we lie on the right side the passage of the food is facilitated by its own weight, the natural obliquity of the stomach from left to right being increased by the changes attending the presence of the food.

But there are questions that still remain to be answered in reference to the gastric fluid, as a digestive agent, viz.:—What is the quantity in a given time of this secretion which is poured out from the secretory surface of the stomach? what is its precise chemical nature or quality? and whether, after it has operated in the formation of chyme, that chyme is always of the same nature?

In respect, however, both to the quantity and precise quality of the gastric juice, there is some

difficulty, since it is next to impossible to procure it entirely unmixed with the other secretions which are poured out from the stomach simultaneously; and then again it is supposed that it varies in different stomachs, or even in the same stomach at different times. Magendie remarks, that the application of different substances to the surface which secretes it constantly modifies its nature; and 'it is at least certain,' says Dr. Paris, in his Treatise on Diet, 'that the gastric juice varies in different animals: for example, that of man is incapable of acting (readily) on bones, while that of a dog digests those substances perfectly.' It has, however, been conjectured that the average quantity secreted is about a pound in twenty-four hours; and Dr. Good remarks in the following way as to its quality:—'It is a thin, transparent, and uninflammable fluid, of a weak saline taste and destitute of smell.' Generally speaking, it has a near resemblance in its external properties to the saliva, and is neither acid nor alkaline; though in these qualities it seems to vary more or less not only in animals, whose digestive organs are of a different structure from those of man, but even in the same animal under different circumstances. It may, however, be laid down as a regular rule that in carnivorous and graminivorous animals, possessing only a single stomach, this fluid is slightly acid, and colors blue vegetable juices red. In omnivorous animals, as man, whose food is composed of vegetable and animal materials indifferently, it is neutral; and in graminivorous ruminating animals with four stomachs, and particularly in the adults of these kinds, it is slightly alkaline, and colors blue vegetable juices green.

Dr. Prout, and some of the continental chemists, have contended for the generation in the gastric juice of muriatic acid, both free and combined with alkalis. Leudet and Lassaign have lately instituted experiments which in some measure contradict those of Prout, Tiedemam, and Gmelin, so that the subject may be considered in some measure still sub judice.

We will just make room for the insertion of the following extract from Dr. Elliotson on the subject of the digestive organisation and functions in other animals beside man.

In granivorous birds the food passes into the crop, and from this into a second cavity, from which it enters the gizzard, a strong muscular receptacle, lined by a thick membrane, in which, instead of been masticated, it is ground down by means of pebbles and other hard bodies swallowed instinctively by the animal; hence true salivary glands do not exist about the mouth of birds, but abound in the abdomen opening into the lower part of the crop and the gizzard. In carnivorous birds, the gizzard is soft and smooth. The fluids of both crop and gizzard contain a free acid, according to Tiedmann and Gmelin, which is the muriatic or acetic.

Some graminivorous quadrupeds, with divided hoofs, have four stomachs, into the first of which food passes when swallowed, and from this into the second. It is subsequently returned by portions into the stomach, chewed, and again swallowed, when, by a contraction of the openings of the two first stomachs, it passes over them into the third, and from this goes into the fourth. The process can be delayed at pleasure when the paunch is quite full. Some birds and insects also ruminate. The same chemists found the fluids of the two first stomachs alkaline, and of the third and fourth acid. The stomachs of some insects and crustacea contain teeth. Some zoophytes are little more than a stomach; others have several openings on the surface leading by canals that unite and run into the stomach—a structure, called by Cuvier mouth-root. Between the most distinct kinds of stomach we see numerous intermediate varieties. The cardiac half of the interior of the stomach of a horse for example, is covered by cuticle, and appears merely recipient, while the pyloric half is villous and digestive, and the state of the contents in each half is therefore very different, a link thus existing between such stomachs as the human and the ruminating.'

And with respect to our last question propounded above, viz. whether chyle be the same whatever aliment it may be manufactured from? Magendie and others have proved that it is not, but that there are as many species of chyme as there are food; and even this difference continues to exist in dung in a considerable measure after the duodenal action, and the biliary and pancreatic secretion have together operated the further change so as to have converted the chyme into chyle; for, according to the experiments of the ablest physiologists, this last fluid differs in composition, according to the nature of the ingesta from which it has been formed. When the individual, for instance, has been chiefly sustained by sugar, the chyle is without that mixture of fibrine which is found when the food has been principally composed of animal matter; and when much oil or fat has entered into the constituents of the aliment, the chyle differs both in appearance and odor from that under common circumstances—it is more acrimonious or alkalescent.

Magendie, we may take occasion here to remark, concluded by a series of experiments that no animal is capable of deriving nutriment from any material that does not contain some portion of nitrogen or azote; for, on feeding animals of various kinds on substances without a sensible portion of this principle, such as sugar, gum, olive oil, and butter, together with distilled water, and limiting them to this diet, they gradually lost flesh and strength, and at length died; and it proved a singular circumstance in these experiments that all the animals, before death, exhibited an ulcer in the cornea, which sometimes so spread as to empty the eye of its humors.

But we are now to consider the duodenal and other changes which the chyme undergoes. It has already been said that when the mass enters into this gut (the duodenum) it becomes mixed with the secretions poured into this organ from the pancreas, the liver, and the duodenum itself: here then it becomes chyle; or the duodenum may be considered, as we have above intimated, a second stomach. Now let us enquire what part the bile, what the pancreatic secretion, what the spleen, and what the omentum may be con-

sidered as contributing to this conversion of chyme into chyle.

It is a curious fact that there is considerable similarity in the nature of the pancreatic secretion and that from the salivary glands; and that there is a sympathy between the secretory organs of the one fluid and the other, so that what excites the salivary secretion excites simultaneously the pancreatic; and it should seem that what the saliva does for the mass in the mouth, the pancreatic juice does for the chyme in the duodenum. It is also observable that the pancreatic fluid is in larger quantities in herbivorous than in carnivorous animals; and, upon the whole, it seems fair to infer, with some physiologists of the present day, that it 'animalises the unazotised principles of vegetable food.' It is easy to conceive that there are greater impediments in the way of ascertaining the average quantity of this secretion than that of the saliva or the gastric juice itself.

The questions of interest in reference to the bile are—whence does it proceed? or in what manner is it secreted? and how far is it necessary for the completion of the chyliferous change?

'It has been disputed whether the bile is produced from arterial or venous blood. Although the former opinion is countenanced by the analogy of other secretions (see the section on *Secretion*), nevertheless more accurate investigation proves that the greater part, if not the whole, of the biliary secretion is venous. With respect to arguments derived from analogy, the vena portæ, resembling arteries in its distribution, may likewise bear a resemblance to them in function. Besides, the liver is analogous to the lungs, in which the great pulmonary vessels are intended for their function, and the bronchial arteries for their nourishment; and, if we are not greatly mistaken, the use of the hepatic artery is similar. We would, however, by no means completely deny its importance in the secretion of bile, but must regard it as inconsiderable, adventitious, and not well established.' So writes Blumenbach; and Dr. Elliotson, in commenting on this passage, remarks, that two instances have occurred in London of the vena portæ running, not to the liver, but immediately into the vena cava inferior. The bile must have been secreted entirely from the blood of the hepatic artery. One of these is described by Mr. Abernethy, and the other is mentioned by Mr. Lawrence. We must not forget, Dr. E. adds, that in the mollusca there is no vena portæ, and the liver secretes its blood from the aorta. M. Simon informs us that, after tying the hepatic artery in pigeons, the bile was secreted as usual; but after tying the vena portæ none was produced. Akaau found water injected into either the vena portæ or the hepatic artery exude on the surface of the liver, but this might be mere imbibition.

Upon the whole it seems a fair inference that the vena portæ is destined for the formation of bile principally but perhaps not wholly, and in cases of lusus naturæ the hepatic artery is called upon to supply its place; but it would be an interesting trial, to find whether bile, when thus secreted from the hepatic artery, is the same in chemical composition or absolute essence as when furnished by the vena portæ.

After the bile is secreted it is conveyed through its appropriate conduits into the duodenum; but even here there is a question, both with respect to the quantity of supply and whether the retention of it in the gall-bladder is necessary to the full saturation of its specific quality.

It has been observed by Bichat, Blumenbach, Douglass, and others, that cystic bile becomes more concentrated, viscid, and bitter, by stagnating in the gall bladder, the cause of which may be the absorption of its aqueous portions by the lymphatics; or by something positively added in this viscus; and although some animals are without a gall bladder, and although this viscus is absent in some rare cases in our own species, yet as a general circumstance it may be remarked, that in the carnivorous animals its existence seems far more general than among vegetable feeders. Now, as the carnivori are for the most part animals which can bear longer intervals of fasting than the herbivorous race, the gall bladder has been conjectured, by Cuvier, to be a reservoir of bile in cases where the animal is subject to lengthened periods of fasting from irregular or deficient supply of food. It may then have reference both to quantity and quality, or serve as well the purpose of a reservoir as an elaborator.

It is worthy of notice that the supply of bile is regulated by circumstances which create its demand. 'I attended a case,' says Dr. Monro, 'in which there was an abscess of the liver, and a preternatural communication between that organ and the lungs, through which the bile was secreted, and discharged by coughing. The quantity thus discharged was very different at different times. It was always greater after meals, and especially for an hour after dinner.' As a certain measure then, but not the same quantity, of bile may always be required, the gall bladder may serve to retain it for those occasions when the stimulus of eating is absent. But on these heads we have not much more than conjectural inference.

Whether the bile in the general way, and without the interference of disordered action, makes its way at all into the stomach has been a subject of enquiry. To us it would appear that bile getting into the stomach in any measure, or in any way, would imply disease; for had nature required this fluid for the formation of chyme it would most probably have been contrived that the ducts from the liver would have passed directly into some part of the stomach, and it should seem that all return through the pylorus into the stomach is contrary to the obvious construction of the pyloric valve, which is manifestly formed for the passage of matter only in one direction. Richerand, however, supposes that some portion of the bile always finds its way into the stomach, while Blumenbach and others are of a contrary opinion. After speaking of the uses of the fluid, the last mentioned author remarks: 'We shall omit the less probable uses assigned to the bile, v. g. of exciting hunger by regurgitating into the stomach—a circumstance which, we think, can hardly happen during health.'

The uses of the bile, in Blumenbach's opinion, are, that 'it gradually precipitates the

fæces and separates the milky chyle from the mixed and equable pultaceous chyme, while this is passing through the tract of the small intestines after being propelled from the stomach into the duodenum, and diluted by the pancreatic juice. It separates itself,' he continues, 'into two portions, the one serous, the other resinous. The latter combines with the fæces, tinges them, and is discharged with them; the former is probably mixed with the chyle and carried back into the blood. The bile seems to act, moreover, as a stimulus to the peristaltic motion of the intestines.'

It is supposed by Dr. Prout, 'that during the precipitation of the chyle, and the decomposition of the bile, a gaseous product is usually evolved, the mass becomes neutral, and traces of an albuminous principle commence, strongest at a certain distance from the pylorus, below the point at which the bile enters the intestines; and gradually fainter in each direction. On mixing with chyme out of the body, a distinct precipitation takes place, and the mixture becomes neutral; but the formation of an albuminous principle is doubtful probably from the want of the pancreatic fluid. The bitter and bilious matter passes off with the fæces, while the soda of the bile probably combines with the acid, and contributes to the formation of chyle. The loss of the alkali, which preserves the picromel in solution, causes the separation of the latter; and Dr. Prout found the distinctive qualities of it the more evident the further from the intestine it was examined.

We continue our extract from Dr. Elliotson, who goes on to say: 'It is no longer wonderful that in jaundice it is so intense that no bile is seen in the fæces; and, according to Dr. Fordyce, even in artificial obstruction of the choledochus by ligature, nutrition continues, though no doubt less perfectly than in health. For Tiedemann and Gmelin after tying the biliary duct, which proved on dissection to have continued impervious, found the thoracic duct still containing an abundance of matter, yellowish, indeed, from the jaundice, but coagulating, and its coagulum becoming red, precisely like chyle; the small intestines had the soft flakes usually considered chyle, but thought mucus by them; and both large and small intestines contained nearly all the principles, except those of the bile, seen in sound animals; but the contents of the large intestines were exceedingly offensive. In the less satisfactory experiments of MM. Leuret and Lapaigne, the thoracic duct was still full of chyle.'

The conclusion from these experiments and observations would therefore appear to be, that, although the bile thus materially aids in separating the chyle from the other portions of the duodenal contents, the chyle *may* be formed without it, but probably in much inferior quantity, and in a state of much less perfection.

With these inferences the experiments and observations of Dr. Blundell and Mr. Brodie will be found to harmonise, both of whom, and Dr. B. in the first instance, tied the choledic duct for the purpose of ascertaining how far the process of nutrition, and the formation of chyle, were dependent upon the supply of bile from the liver to the duodenum.

'When an animal,' says Mr. Brodie, 'swallows solid food, the first change which it undergoes is that of solution in the stomach. In this state of solution it is denominated chyme. The appearance of the chyme varies according to the nature of the food. For example, in the stomach of a cat the lean or muscular part of animal food is converted into a brown fluid of the consistence of thin cream; while milk is first separated into its two constituent parts of coagulum and whey, the former of which is afterwards redissolved, and the whole converted into a fluid substance with very minute portions of coagulum floating in it. Under ordinary circumstances the chyme, as soon as it has entered the duodenum, assumes the character of chyle. The latter is seen mixed with excrementitious matter in the intestine; and, in its pure state, ascending the lacteal vessels. Nothing like chyle is ever found in the stomach; and Dr. Prout, whose attention has been much directed to the chemical examination of these fluids, has ascertained that albumen, which is the principal component part of chyle, is never to be discovered higher than the pylorus. Now, in my experiments, which were made chiefly on young cats, where a ligature had been applied so as to obstruct the choledic duct, the first of these processes, namely the production of chyme in the stomach, took place as usual; but the second, namely the conversion of chyme into chyle, was invariably and completely interrupted. Not the smallest trace of chyle was discoverable either in the intestines or the lacteals. The former contained a semi-fluid substance, resembling the chyme found in the stomach, with this difference, however, that it became of a thicker consistence in proportion as it was a greater distance from the stomach; and that, as it approached the termination of the ileum in the odeum, the fluid part of it had altogether disappeared, and there remained only a solid substance, differing in appearance from ordinary feces. The lacteals contained a transparent fluid, which I suppose to have consisted partly of lymph, partly of the more fluid part of the chyme, which had become absorbed.

'I conceive,' continues Mr. Brodie, 'that these experiments are sufficient to prove that the office of the bile is to change the nutritious part of the chyme into chyle, and to separate from it the excrementitious matter. An observation will here occur to the physiologist. If the bile be of so much importance in the animal economy, how is it that persons occasionally live for a considerable time in whom the flow of bile into the duodenum is interrupted? On this point it may be remarked, 1st. That it seldom happens that the obstruction of the choledic duct from disease is so complete as to prevent the passage of the bile altogether; and the circumstance of the evacuation being of a white color may prove the deficiency, but does not prove the total absence of bile. 2dly, That in the very few authenticated cases which have occurred of total obliteration of the choledic duct in the human subject, there has been, I believe, always extreme emaciation, showing that the function of nutrition was not properly performed. 3dly, That the fact of individuals having occasionally lived for

a few weeks or months under these circumstances, only proves that nutrition may take place to some extent without chyle being formed. In my experiments I found that the more fluid parts of the chyme had been absorbed, and probably this would have been sufficient to maintain life during a limited period of time.'

It seems then, upon the whole, sufficiently evident that the fluid secreted by the liver, and transmitted into the duodenum, has a very considerable influence towards completing the process of chyle formation; there are some other notions respecting the office of this great viscus in the animal economy which are probably somewhat more hypothetical, but yet do not seem destitute of foundation, we mean that, like the lungs, it helps to rid the system of carbon. It is to be recollected that it is only to these two viscera, the lungs and the liver, that venous blood, blood charged with carbon, is transmitted; and it is matter of common observation that bilious diseases are most frequent in hot climates and seasons, which is attributed to the greater abundance of the bile in those times and circumstances, when less carbon passes off by the lungs, there not being so much occasion for the absorption of heat into the frame. Conformably to this theory it has been remarked, that 'in the fœtus, for whose temperature the mother's heat must be sufficient, the lungs perform no function, but the liver is of great size, and bile is secreted abundantly, so that the meconium accumulates considerably during the latter months of pregnancy. We shall see, indeed, that at the very time the functions of the lungs suddenly begin at birth, the liver suddenly loses so much of its supply of blood. Warm-blooded animals with large lungs, living in the air, have the liver proportionably smaller than those which live partly in water; in cold-blooded animals and reptiles, which have lungs with large cells, as but slightly to decarbonise the blood; in fish, which get rid of carbon but slowly by the gills; and in the molucca, which decarbonise still more slowly by gills or lungs, the liver is proportionally large. More blood flows to the liver accordingly as the lungs are less active organs. In the mammalia and birds it receives the blood of only the stomach, intestines, spleen, and pancreas; but, in the cold-blooded, of many other parts; in the tortoise of the hind legs, pelvis, tail, and vena azygos; in serpents of the right renal, and all the intercostal veins; in fish of the renal veins, the tail, and genitals. It is moreover said that in pneumonia and phthisis more bile is secreted; and in the *blue disease*, and other affections of the heart, that the liver is enlarged. The constituents of the bile contain a large quantity of carbon, which is chiefly in union with hydrogen, and under the form of resin or fatty matter, and resin is most abundant in the bile of herbivorous animals, whose food contains a very large proportion of carbon and hydrogen. In the lungs the carbon may be said to be burnt, whence animal heat; in the abdomen it passes off still combustible.'

Of the use of the spleen.—This still continues to be a physiological problem. That a large viscus should be found without any obvious intention seems extraordinary, and Dr. Paley, when he is treating on final causes, suggests 'that it may be merely a stuffing, a soft cushion to fill up a vacuum or hollow, which, unless occupied, would leave the package loose and unsteady;' thus supposing, as Dr. Elliotson wittily and sarcastically states it, that a pad is necessary to make the viscera fit, just as hatters put stuffing under the leather of a hat which is made too big for the head. 'When,' he adds, 'I consider the stupendous power and design displayed throughout nature, I instantly revolt at such an explanation as Paley's, to say nothing of its anatomical absurdity.'

The most generally entertained opinion of the office of this viscus is that it proves subservient to the stomach and liver, by collecting blood for the purpose of being sent to these last organs when a more than ordinary supply is required; and this inference has been drawn from the mode in which the blood-vessels of the spleen are connected with those of the liver and stomach; this last organ, when it is full, not only compressing the spleen by its distension, but, from the very same pressure, causing a diversion of blood from the spleen to itself. Mr. Pring, we believe, in a work of great originality, was the first to combat this supposition, and to maintain that we have no proof that the repletion of the stomach effects any material compression on the spleen and its blood-vessels, so as to alter the circulation. 'Besides, in ruminating animals, as Blumenbach observes, it lies next the first stomach or paunch, and, if compressed, must be so before digestion begins; and in proportion as the fourth stomach fills, and digestion proceeds more actively, is the distension of the paunch diminished.'

Sir Everard Home conceived that a great proportion of the liquid which disappears from the stomach might get from the cardiac extremity of this organ into the spleen, and thence into the mass of blood; but from later experiments he has been induced to abandon this hypothesis, and the real office of the spleen still continues among the arcana of nature. It is, however, most probably connected in some way with the digestive and assimilating functions, and it is a remarkable fact, long ago observed, that the extirpation of this organ sometimes renders the bile in the gall bladder pale and inert. Some physiologists have recently speculated on the use of the spleen in the lymphatic system; and still more recently it has been thought a secretory organ with a glandular duct, but nothing very satisfactory has been elicited from these views of the subject, and we repeat that more facts are wanting than hitherto we are in possession of to render fully evident the precise use of this viscus in the animal economy.

The *omentum* would seem principally ordained for the purpose of lubricating the intestines, and assisting their constant motion; but it has been suggested that this also as well as the spleen may serve as a diverticulum to the viscera; 'if,' says Blumenbach, 'we reflect on the singular structure of the omentum parvum, or hepatogastrum especially, we may be inclined to believe that there is another, and perhaps principal

office attached to it unknown at present, and discoverable by comparative anatomy.'

Respecting the functions of the large intestines we cannot do better perhaps than present to our readers the following extract from Dr. Capland.

'To the functions of the larger intestines may be given the term fæcation, because it is in this situation of the digestive canal that the fæcal matter is found. In its course through the small intestines the alimentary matters are deprived of their chyle, and of a portion of their aqueous parts; the residue is poured into the colon, where its course is more slow, and where it assumes new characters. The fæcal mass, according to the properties which it presents at the commencement of the colon, is evidently composed—1st. Of the residue of the aliments; and 2d. Of the excrementitial parts of the secretions poured into the superior parts of the digestive tube. The fæces, when they arrive in the rectum, or at the time of their expulsion from the body, are greatly increased by the more solid parts of the secretions poured out upon the internal surface of the colon, their more fluid parts having been absorbed. It is in some measure owing to the quantity and properties of the excrementitial parts of these latter secretions, which principally proceed from the follicular apparatus of this intestine, that the fæces present distinctive characters.'

Gaseous substances generally are found in greater or less abundance in the small intestines. This gas may come from more than one source; it may arise from the change which the alimentary substances undergo in their course, or it may be secreted by the mucous membrane of the intestines themselves. While we would not altogether deny a share in its production to the former, we contend for the latter. We believe that the mucous membrane of the digestive canal may both secrete gaseous substances and absorb them; and we found our belief upon the following circumstances:—1st. We have proofs, derived from experiment and observation, that gaseous substances are absorbed and given off from the mucous membranes of the respiratory apparatus. 2d. Pathological facts intimately connected with the functions and properties of this membrane, in different parts of the body, support the position. We have, however, no doubt that the changes which the alimentary substances undergo in the stomach occasional y give rise to gaseous products, and we believe that a similar result follows the removal of the excrementitial matters in the colon and rectum.

On the urinary secretion, which the reader will perceive by turning to the table of arrangement Richerand introduces under the head of digestion, we shall have to offer a few remarks when considering the subject of secretion; at present we shall limit ourselves to remarking that the transmission of fluids from the stomach to the urinary organs, and other parts, is a physiological problem that has not been satisfactorily solved.

Of Assimilation and Absorption.

Assimilation and absorption are the processes by which that remarkable characteristic of organic being, upon which we have commented in the introductory part of the present treatise, is effected and maintained. Our author says that a definition of life might be taken from the singular property which is possessed by a living being of preserving an independence of interior temperature through all the chances and changes of exterior heat; but, besides that this principle and law of living matter is subject to much qualification, it appears to us that life is still better distinguished from inorganic matter by the faculty which it possesses of making dead matter subservient to its own purposes, of attaching it to itself, and occasioning it to become an integral portion of the organised frame.

In respect, however, to the absolute nature and modus operandi of this faculty there is still much of doubt and dispute. Some supposing that the repairing function is exercised through a distinct order of vessels, the lacteals and lymphatics, for which see Anatomy. Others conceiving that matters are taken up both from without and from internal parts by the blood vessels, more especially the veins; from internal parts we say, for we shall afterwards see, when on the subject of exhalation and secretion, that there is a constant expulsion from the blood of matter, part of which is thrown out of the frame entirely, and part reabsorbed, or again taken up into the circulating mass.

In the section just concluded on digestion, we talked of chyle, and its separations from the effete part of the alimentary mass; but we did not pursue this same chyle on to its ultimate destination, which is that of the blood vessels through the lacteal vessels, opening in the villi of the intestines—the small intestines mainly—and running on into the receptacle of the chyle, to be conveyed by the thoracic duct into the blood vessels at the angle, found by the union of the subilavian and jugular vein.

Now no one doubts that these lacteal vessels are the main instruments through which nutritious matter is conveyed into the blood, and by which nutrition is thus mainly effected; but there are disputes still existing whether their office is actually limited to this function, and whether the other portion of vessels which with the lacteal have been, since the discovery of both of them, considered the vessels appropriated alone to the process of absorption, are in reality such; or whether the old supposition of imbibition or penetration through the coats of the veins of matter from without, the vessels must not be received to enable us to account for all the phenomena attendant upon absorption. Another point of uncertainty, in reference to the function now under notice, is this, whether any matter is taken up from the outer surface and conveyed into the blood-vessels, while the external skin or cuticle remains as an entire covering to that surface. In other words does the surface of the body absorb? It behoves us then in the present section not only to enquire into the rationale of assimilation and absorption, but to advert to these disputed particulars.

In respect to the lacteals and their office, there is something very singular in the selecting power which they manifest; for, although the chyle is

applied to their mouths mixed with other matter, that other matter is rejected by them, and the chyle alone selected. This power indeed is manifested throughout the system of absorbents generally, some substances being chosen, and some left as unfit for reception. Every one has seen marks on the skin of sailors and others, which have been artificially made by pricking holes in the cuticle, and then rubbing into these holes charcoal or gunpowder; and these marks thus made remain permanent, because the absorbent power refuses to take the materials with which they are made into the mass of circulation. Indeed we might give another explanation of this phenomenon, viz. that fluidity being a necessary circumstance for absorption, these substances are not absorbed because they are not soluble in the fluids of the body. But a selecting principle is manifestly in operation throughout the whole absorbing system; and Magendie has contended for this principle, in the lacteals being carried to such an extent, as that they can be made to absorb nothing but chyle; a doctrine, however, which seems disproved by the well known experiments of Mr. John Hunter, who, pouring milk into the intestines of a dog, found the lacteals soon after filled with it. Different matters too will be taken up by the lacteals, carried through the circulation, and afterwards thrown out by emunctories; although, with respect to the extent and nature of this principle, there are confessedly some reasons to be doubtful.

What is the rationale, it is natural to enquire, of the process by which chyle is received into the minute branches of the lacteals, and conveyed on to the blood? That open mouths are exercised in this case at least, and that chyle does not penetrate the coats of the absorbent, has been demonstrated; so that, whatever may be the laws of absorption in other parts of the frame, in this there is not merely a selecting but an imbibing power displayed, and the chyle once received is as it were sucked through the vessels by a vital force, more similar than any other to that of capillary attraction in inanimate nature; but still different: or at least if there be an actual similarity in the mode of drawing up liquids through minute tubes, and the transmission of the chyle through the minute lacteals there is in the latter case a regulating force which must considerably modify the result; and, although it is right to call in the aid of natural philosophy for the explication of living actions, the mistakes which our ancestors have been led into from too largely admitted analogies ought always to be in recollection.

On the mesentery there are numerous glands attached to the lymphatic vessels, and which are so situated that the chyle, in passing on to the blood, traverses them; it is of course natural to suppose that some operation is performed by these glands upon the chyle: a supposition which is strengthened by the fact that although under some forms of disease, as in the mesenteric atrophy of children, the glands in question remain previous for the transmission of the chyle, the body nevertheless becomes emaciated, as if from an insufficient supply of chyle to the blood. These glands are cellular in their construction, and it is supposed that the matter contained in the lacteals entering into them is poured into these cells, which matter is taken up by the vessels running out of them in the way of absorption, and that thus something more than a mere passage mechanically, as it were, through the gland, is accomplished.

So far then every thing is to a certain degree evident on the function of assimilation. We have seen that a separation of the chyle from effete matter is effected in the upper part of the alimentary tube, and that the former is conveyed by distinct and appropriate conduits on to the blood-vessels. The chemical composition of the chyle we refer to the article Chemistry; here limiting ourselves to saying that the contents of the thoracic duct have been found differently filled, according as the animal upon which the examination is made shall have fasted for a long time, or have lately taken food: in the latter case the fluid is more albuminous, and really chyliferous; in the former it has more of the character of lymph. Does not this circumstance, by the way, in some measure militate against the assumption of Magendie; that it is chyle, and chyle only that the lactiferous vessels will take up?

The lymphatic system of vessels is so similar in appearance to the lacteals that an inference has been made, from this similarity, in favor of their being the exclusive absorbents of the general frame, while the lacteals are principally the absorbents of the chyle. But it must be observed that their open mouths have never yet been discovered, so that when it is stated that they arise by such open orifices from different structures, and take up the fluid which these tissues pour out, we rather talk inferentially than in the way of demonstration.

Besides the chyle separated from the fæces in the small intestines, there are the halitus of the cavities, properly so called, especially that of the fauces and of all the mucous tela, the more watery part of those secreted fluids which are retained for some time in their ducts, i. e. in the breast, the vesiculæ seminales, the gall-bladder, &c., and not a small portion of the stellatious fluids, which are applied to the common integuments.

The solids, after performing their purpose in the animal economy, insensibly melt away, and are absorbed, as is proved by the greater part of the thymus gland during infancy, of the roots of the first teeth, and of the alveoli, after the second teeth have fallen out. The constant change of the whole osseous system, arising from the insensible renovation of bony matter, may also be adduced.

Indeed this process of absorption is so constant and so universal, that no part of an organised frame continues to have from day to day the same identity; in the fingers which now direct the pen of the writer not a particle of the same matter probably exists that constituted the structure of the parts a twelvemonth since, and the same mutation is incessantly going on through every part and portion of the frame; an argument has indeed hence been drawn against what is called materialism, since consciousness and identity remain, while the material particles of the body are thus unceasingly running their round of mutations.

We have already intimated that analogy led to the inference that as the lymphatics appear nearly the same in structure and peculiarities as the lacteals, the two systems together constitute the whole of the absorbing system; and this is in truth the generally received doctrine of the present day, more especially in this country, since the anatomy and peculiarities of the lymphatic system have been so ably elucidated by the labors of Hewson, John Hunter, and Mr. Cruickshank.

Some French and American and German physiologists have lately endeavoured to prove that the principal part of absorption is effected through the medium of the veins; thus in some measure reviving the old doctrine of imbibition into the blood, directly through the coats of vessels, and not by a distinct and exclusive system of organs.

The arguments of Magendie and others in favor of venous, as opposed to lymphatic absorption, are shortly the following:—In the first place they urge that the suddenness with which the secretions are sometimes affected is inconsistent with the notion of the course of absorbed fluids through the lymphatic and the thoracic duct (we should perhaps have premised that lymphatic absorption implies this course, since the termination of most of the branches of the lymphatics is into the thoracic duct); and still further they say, that as the urine often becomes tinged in a very short time with turpentine, rhubarb, copaiba, and other substances, while no such tinge is traceable in the lymph contained in the thoracic duct, it would seem that this channel is not their course to the kidneys. To this, however, it may be replied, that the fact militates equally against venous absorption itself, since the round of circulation must be performed equally in one case as in the other, and, moreover the blood is apparently often as free from the impregnation adduced, as the contents of the thoracic duct. Not, however, always.

The objectors further state that, when the thoracic duct of a dog is tied, an infusion of nux vomica injected into the stomach or rectum, kills as quickly as though the ducts were pervious. But in this case the nervous organisation may be the media of transmission; and it is not necessary to suppose any absorption at all for the production of the effect.

But we must here find room for one or two of the positive experiments in favor of the imbibing power of the venous coats, or of the admission of matter into the blood through these coats. A vein was placed in some acid liquor with its two extremities projecting from this liquor; then a stream of warm water was injected through the vein by its orifices, and, after continuing this injection for some time, the current of water which passed out of the lower orifice of the vein was sensibly impregnated with acidity. This fact, then, it is urged, proved a communication between the interior of the vein and the liquid in which its exterior was immersed; indeed, it showed actual venous absorption. But still the lymphatic physiologists reply to this, that the condition of a vessel may be changed by subjection to these trials; and it does not follow that the coats of a vessel would have thus proved pervious if it had been in its natural condition, and surrounded merely by the exhalations of the living body.

'Three ounces of diluted alcohol were given to a dog; in a quarter of an hour the blood of the animal had a decided smell of alcohol; the lymph of the thoracic duct had none.

'Half a pound of assafœtida dissolved in the same quantity of honey was given to a horse, which was afterwards fed as usual, and killed in sixteen hours. The smell of assafœtida was perceptible in the veins of the stomach, small intestines, and cæcum; but not in the arterial blood, nor in the lymph.'

It is allowed by the same author from whom we extract the account of the last two experiments, that in Fiedemann's and Gmelin's trials, among a variety of substances taken, colored, odorous, or saline, very few could be detected in the chyle, but many were found in the blood.

These and other experiments and observations which might be adduced, did our limits permit, have led to the inference that the only general absorbents are the veins; that the lacteals merely take up the chyle from the food; that the lymphatics are not in reality absorbents; and that the villi of the intestines are composed partly by venous twigs which absorb all the fluids in the intestines excepting the chyle; this last being taken up by the lacteals, and going into the blood through the receptaculum chyle and thoracic duct. It is supposed, moreover, that the intestinal fluids having been received by the veins are carried on to the heart and lungs, having first been conveyed into the liver by the vena portæ, whose function it is minutely to subdivide and mix with the blood the fluids thus absorbed; which subdivision and intermixture is necessary to prevent their proving detrimental.

The physiologists who thus argue against lymphatic absorption suppose the purpose which these vessels serve in the animal economy is that of conveying the finer parts of the blood to the heart, as the veins convey the grosser and colored portion of the fluid. And it must be confessed that their positions and inferences are considerably forcible. But, on the other hand, many facts favor the other side of the question: how, for instance, can we explain the circumstance of a poison inserted into a part of the frame, and running often with great rapidity along the course of a lymphatic trunk, unless this last vessel were possessed of an imbibing power, and its minute extremities had open mouths? A cancer of the breast may be often clearly traced in its progress through the adjoining lymphatics into the lymphatic glands of the axilla; and it is too well known that the extirpation of the diseased part is generally unavailing after the neighbouring glands have thus taken on disordered action, inasmuch as the lymphatic vessels now appear to have absorbed into the system that peculiar something upon which cancer depends; and have converted a topical into a constitutional ailment. Who does not know, also, that mercurial friction is the most availing when performed where the lymphatics and their glands are most numerous? In

our observations also, on various imbibitions, we ought always to recollect that the lymphatics are connected with the veins. Some experiments have even propelled mercury into the vena portæ through the lymphatic absorbents; and altogether we should say that although much may be advanced on both sides of the question, and although great credit is due to the ingenuity of the physiologists to whom we have alluded, we have still, perhaps, 'reason for believing that the economy of secretion and absorption is effected by two systems of vessels distinct from veins and arteries, and in a state of health continually holding a balance with each other.'

Is absorption effected by the surface? or, in other words, does the skin while it is entire—the outer skin—admit of the entrance into the body of any matter from without? This question, like that of lymphatic absorption itself, is still unsettled among physiologists, some embracing one, others arguing on the other side.

It is well known that by bathing the body in water thirst is oftentimes much alleviated, as is sometimes done by sailors when their supply of fresh water fails them; they often, indeed, in order to allay thirst, strip their shirts off, dip them into the water, and put them on wet. Here, it should seem, say those who defend the doctrine of cutaneous absorption, that some of the fluid applied to the surface must get into the fluids of the body. No; say their opponents, that does by no means follow; and we may ascribe the relief from thirst by this expedient, upon the principle of the grateful sensations produced, and the consequently altered conditions of those parts upon which thirst depends.

By the much quoted experiment of Dr. Watson, as well as by several others, it has however been shown that the actual weight of the body is occasionally increased without taking any thing into the stomach. Dr. W. gave a Newmarket jockey, previously to a race, a glass of wine, which weighed little more than an ounce, and upon his being weighed immediately after the course he was found to have increased thirty ounces, notwithstanding there must have been considerable expenditure of the fluids by perspiration. Here, however, the objectors to absorption by the surface are furnished with a reply; and they suggest that the matter by which the additional weight was given to the body might have been taken in by the lungs, which all allow are absorbing surfaces, because the cells are not, as on the exterior of the body, lined with cuticle. In order to meet this objection, experiments have been made of application to the surface of matters while the person was breathing through an aperture so that none of the matter, if any were diffused in the room, could have been taken into the system by the lungs; in some instances the results of these trials have favored one, and in others the other side of the question; and, probably, as well in this as in most other cases, an intermediate inference is the true one. Absorption may be generally difficult while the epidermis or scarf skin is entire; but it does not seem to form a complete barrier against the admission of every thing from without.

Richerand has the following remarks on this subject:—'The increased weight of the body after exercise in wet weather; the abundant secretion of urine after remaining long in the bath; the manifest enlargement of the glands of the groin after keeping the feet immersed for a considerable time in water; the effects of mecurial frictions, &c., show in an unquestionable manner that absorption takes place through the skin, with more or less rapidity according to circumstances. It must, however, be taken into account that the means which promote cutaneous absorption, operate at least as much by altering the structure of the epidermis as by increasing the action of the absorbing surfaces. In this manner the bath appears to operate by softening the texture of the epidermis; and frictions by raising and displacing its scales.'

This last intimation of Richerand we think deserves particular attention in reference to the point in dispute; for it should seem that without actual abrasion of the outer skin its layers may, by rubbing or softening, be so taken off temporarily from the absorbing surface of the inner skin as to occasion substances to enter which would not otherwise. We all know that where the cuticle is thin absorption is attended with less difficulty than in other parts, and that rubbing certain matters on the surface will occasionally procure them an inlet when merely placing them on the surface would not have proved sufficient. The writer of this paper has often appeared to succeed in ordering the abdomen to be rubbed with castor oil, in cases where the irritability of the stomach had precluded the admission of purgatives by the mouth; and in one case, after a good deal of this kind of friction, some castor oil was detected in the urine which could not well be accounted for in any other way than by absorption from the surface: the surface, however, not being actually abraded.

The settling indeed of this dispute, respecting cutaneous absorption, is not a matter merely of physiological curiosity; but necessarily would have considerable bearing upon the question of the medicinal powers of impregnated baths, and other external applications beyond the circumstances of temperature or friction. But we should be wandering from our present duty in pursuing this path of investigation.

Of the Circulation of the Blood.

Had we been writing before the time of the great Harvey, the title of this section would have been—on the motion of the blood, and even on that nothing could have been said but what was in some sort vague, hypothetical, and unsatisfactory. To Harvey, and to Harvey alone, are we indebted for the demonstration of the course the blood takes in its distribution to the several and separate parts of the body; although he obtained only obloquy for his pains, and his practice as a physician became diminished in consequence. Harvey was physician to Bartholemew's hospital; he was forty-one when he promulgated the doctrine, and he is entitled to the glory, says Hume, of having made the 'discovery' by reasoning alone, without any admixture of accident.' [illegible] inference [illegible] the blood goes

from and to the heart in a circular way, principally from the disposition of the valves of that organ, and which are clearly so constructed as to admit the passage of a fluid only in one direction; to this he added the consideration that, when an artery is opened, the jet that flows from the puncture does so in a direction from the heart, and the flow is in the contrary direction when we open a vein, and a ligature upon an artery causing blood to accumulate on the side nearest the heart, while a ligature on a vein occasions the swell beyond the puncture. He found too that animals bled to death by wounds in arteries or veins. Subsequently the course of the blood was demonstrated by microscopic observations on cold blooded animals, as on frogs, which show a perpetual flow of blood from the heart to the arteries, and thence into the veins, completing the circular career.

The circulation was, it must be admitted, obscurely hinted at by Servetus, a Spanish physician, who was burnt to death by Calvin in 1553, for impugning a belief in the Trinity; but the passage on which so much stress has been laid as an anticipation of the Harveyan discovery, and which the writer of this paper has examined for the purpose of ascertaining its scope and compass, clearly amounts to nothing more than an announcement of the pulmonary circulation; and even that made in so obscure and imperfect a manner as to give the impression of the discoverer's being scarcely aware of the nature and extent of his own discovery.

In the article Anatomy will be found an account of the structure, form, and position, of the human heart; to that account, in pages 175 and 228, of vol. ii. we refer the reader; here merely calling attention to the circumstance that the organ is furnished with valves or circular folds of membranes that are so constructed as to fall down and admit the passage of a fluid into its cavity, but to be raised up by the contraction of the ventricle so as to prevent the exit of the fluid in the same direction in which it entered; it was from this construction of the heart, and from observing valvular bodies at the mouths of the great blood-vessels from the heart, which, as we have just stated, led Harvey to those reflections which terminated in his ascertainment of the circulation; and it is of great consequence for the physiological student to preserve a constant and clear recollection of the valves of the heart, as well as of the pulmonary artery and aorta, in order to become familiar with the mode in which the vital fluid effects its circuit—vital fluid, we say—not under the notion that vitality can be predicated of the blood any more than of other parts of a living organised body, but merely to express that this fluid is as it were the fountain from whence all parts of the system are supplied with pabulum for the various processes and operations of life. That life is in the blood is as bad philosophy almost as to say that the soul is in the pineal gland, or that affections reside in the heart; all notions of thus localising the living principle ought to be abandoned, with indeed every other that leads to the inference that we can, by searching, find out what life is, or where it is.

There is a great difficulty in following the course of the arteries from their commencement in the heart to their final destination. Authors talk of minute branches ending in the open mouths of exhalants which pour out a particular fluid, either on the surfaces of membranes or by themselves; and these inferences are made rather from what is seen in the way of effect than of actual structure, for no microscopic observations have hitherto succeeded in tracing these open endings of the vessels; and it is to this moment a disputed point by what machinery these several exhalations and secretions are effected, and whether the whole of what we are generally accustomed to consider exhalation or secretion from open extremities may not be merely oozings through the sides of close vessels. At any rate the termination of arteries into the veins is the only one, as stated in the article Anatomy, which has yet been absolutely demonstrated.

When considering the very curious subject of absorption we alluded to this question of vascular termination; at present we have only to do with the mode in which the communication is accomplished between the system of arteries and that of veins, or rather with the manner in which the blood is conveyed from one to another part of this admirable machinery.

The blood, returning from its circuit round the body, is received into the right or anterior auricle and ventricle; from this cavity it is projected through the great pulmonary arteries into the lungs; having circulated through these organs it returns by the pulmonary veins into the left or posterior auricle and ventricle, whence it gets into the aorta, through which it passes on to be distributed through the various ramifications of the arterial system, to be returned into the right or anterior part, whence we began the description of the blood's course. Neither right and left, nor anterior and posterior, are correctly descriptive of the sides of the heart, and physiologists often now use the term pulmonic to denote the side of the heart which used to be called the right, and systemic to indicate the left: the right as we have said being that part from which the lungs receive their supply of blood, and the left being the part for the supply of the whole system; this last being, as might be supposed, and as we have already said (see Anatomy page 288) the most powerful of the two cavities. A sort of double circulation, it will be observed, is thus effected, one through the lungs, and the other through the body generally, a fact to which we shall have to call the attention of the reader in the next section, which will treat of the respiratory process, and the purpose which it serves in the animal economy.

The motions of the heart are described as an alternate systole and diastole, or contraction and relaxation, of the auricles and ventricles in succession. Thus, when the ventricles distended with blood contract upon their contents to force the blood into the pulmonary artery and aorta, the auricles at this moment relax and receive a fresh supply from the pulmonary veins and from the vena cavæ. On applying the ear or a stethoscope, says Dr. Elliotson, to the region of the heart, the distinct sound of the action

of the ventricles and auricles may at once be perceived. At the moment of the arterial pulse is heard a dull sound, and immediately afterwards, without any interval, a clearer sound, similar to the noise of a valve or to the licking of a dog. The former arises from the action of the ventricles, the latter from that of the auricles.

The former occupies about three-fourths of the whole time, the latter one-fourth or one-third, and then a pause occurs of another one-fourth. This is termed the rhythm of the heart's action.

The sounds of the heart are ordinarily heard in health between the cartilages of the fourth and seventh ribs, and under the inferior parts of the sternum; those of the left side of the heart in the former situation, those of the right in the latter.

The shock or stroke occurs at the contraction of the ventricles. The force and extent of the sound and of the shock, and the rhythm of the heart's action are variously altered in disease, and other sounds superadded.

'If,' says Richerhand, and we shall here make a long extract from this excellent physiologist, 'I am asked why the four cavities of the heart do not all contract at once, I answer that it is easier to assign the final than the proximate cause. If the contraction of these cavities had been simultaneous, instead of being successive, it is evident that the auricles could not have emptied themselves into the ventricles. The alternate action is moreover absolutely necessary, as the heart, any more than the other organs, is unable to keep up a perpetual action, the principle of its motion which is soon exhaused being incapable of restoring itself except during rest. But the alternations of action and repose in organs, which, like the heart, perform functions essential to life, must be extremely short in their duration, and at very close intervals.

'The cavities of the heart, however, are not entirely passive during dilatation, and the action of that organ does not wholly depend on the excitement of the blood in its parietes (a question that has been disputed), since the heart, after it has been torn from the body of a living animal, palpitates, its cavities contract and dilate though quite emptied of blood, and appear agitated by alternate motions, which become fainter as the part gets cold. If you attempt to check the diastole (dilatation) of the heart, this organ resists the hand which compresses it, and its cavities appear endowed with a power which Galen termed *pulsive*, in virtue of which they *dilate* to receive the blood, and not because they receive it. In that respect the heart differs essentially from the arteries whose dilatation is occasioned by the presence of the blood, whatever some physiologists may have said to the contrary. I have repeated, but unsuccessfully, the famous experiment by which it is attempted to be proved that these vessels have the power of moving independently of the presence of the blood (this is a question to which we shall immediately advert). An artery (continues Richerhand) tied and emptied of blood, contracts between the two ligatures, but is no longer seen to move in alternate contractions.

'The heart manifestly shortens itself, and the base approaches towards the apex during the systole or contraction of the ventricles. If it became elongated as some anatomists have thought, the tricusped and nictial valves would be incapable of fulfilling the functions to which they are destined, since the columnæ carnæ, whose tendons are inserted in the edges of these valves, would keep them applied to the parietes of the ventricles. The pulsations which are felt in the intervals between the cartilages of the fifth and sixth true ribs are occasioned by the apex of the heart which strikes against the parietes of the chest. In the explanation of this phenomenon it is not necessary to admit the elongation of the heart during its systole; it is sufficient to consider that the base of the heart in which the auricles are situated, rests against the vertical column, and that these two cavities, by dilating at the same time, and by their inability to move the vertebræ before which they are situated, displace the heart and thrust it downwards and forwards. This motion depends likewise on the effort which the blood sent into the aorta makes to bring to a straight line the curvature of the artery, which reacts and carries downwards and forwards the whole mass of the heart, as it were, suspended to it.'

Magendie's remarks on the motions of the heart as externally perceived are the following:—

'Each time the ventricles contract the whole bulk of the heart is suddenly carried forward, and the apex of the organ strikes the left parietes of the chest opposite the space between the sixth and seventh true ribs.

'This displacement forwards of the heart during the systole has given rise to a long and obstinate controversy; some pretend that the heart shortens in contracting; others maintain that it lengthens, and that it ought necessarily to do so; for without this it would not be able to strike the parietes of the thorax, as it is more than an inch distant from it during the diastole. A great number of animals were uselessly sacrificed for the purpose of studying the motion of the heart, and the heart was seen to lengthen and shorten by different observers at the same time. But what experiment was not able to perform a very simple argument accomplished. Bassuet happened to drop in during the dispute, and showed that if the heart lengthened in the systole, the nictral and tricuspid valves kept down by the carnous columns would not be able to shut the auriculo-ventricular openings. The advocates for the lengthening of the heart no longer held out; but it remained to be demonstrated in what manner, when the ventricles shortened, the heart directs itself forward.'

Senac showed that this phenomenon depends on three things; 1st. The dilatation of the auricles, which is made during the contraction of the ventricles; 2d. The dilatation of the aorta and pulmonary artery, in consequence of the introduction of the blood, propelled thither by the ventricles; 3d. The erection of the arch of the aorta, produced by the contraction of the left ventricle.

As the determination of this point is a matter not merely of curiosity, but has some practi-

cal bearings, especially in reference to disordered conditions of the organ, and its consequent movements, we shall further extract from another celebrated physiologist a passage referring to the dispute, and add the comments on the passage by an able physiologist of this country.

'The systole,' says Blumenbach, 'of the ventricles, upon which is said to be spent one-third of the time of the whole action of the heart, is performed in such a way that their external portions are drawn towards their septum, and the apex of the heart towards the base. This at first sight seems disproved by the circumstance of the apex striking against the left nipple, and consequently appearing elongated,—a circumstance, however, to be attributed to the double impetus of the blood, flowing into the auricles and expelled from the ventricles, by which double impetus the heart must be driven against that part of the ribs.'

On this particular we have the following remarks from Dr. Elliotson:—

'Dr. W. Hunter accounted for this in 1746. The systole and diastole of the heart simply could not produce such an effect; nor could it have been produced if it had thrown the blood into a straight tube in the direction of the axis of the left ventricle, as is the case with fish and some other classes of animals; but by throwing the blood into a curved tube, viz. the aorta, that artery at its curve endeavours to throw itself into a straight line to increase its capacity; but the aorta being the fixed point against the back, and the heart in some degree loose and pendulous, the influence of its own action is thrown upon itself, and it is tilted from and against the inside of the chest.'

'Though this is generally allowed,' continues Dr. E., 'Haller remarks that in the frog also, which has a straight aorta, the point of the heart moves forward during the contraction; and some say that while the heart of a dog continues to palpitate after being extracted from the chest, the apex is lifted up at each contraction of the empty ventricles.

'The occurrence is ascribable likewise in some measure to the distension of the auricles; for Haller found the apex give the usual stroke at the nipple on his distending the left auricle with air, and Senac has shown a similar influence from the right auricle also.'

Dr. Barclay has the following passage on this point:—

'When the blood is forced into the arteries their curvatures near where they issue from the ventricles are from their distension lengthened, and extended towards straight lines; and, causing the heart to palpitate in their motions, compel it to describe the segment of a circle, when the apex moving aslantad and sinistrad, is made to strike against the left side. The same kind of motion having also been observed by the celebrated Haller in distending the left or systemic auricle, it must follow that the stroke which is given to the side may be the effect of two distinct causes, either acting separately or in combination; but acting on a heart obliquely situated as ours is in the cavity of the thorax, where the aspect of the base is aslantad and dextrad, and that of the apex sinistrad and sacrad. In combination as the first of the two by removing the pressure will facilitate the influx of the venous blood into the left or systemic auricle which is situated dorsad; so the second, by the influx of blood into the auricle, will contribute in its turn to facilitate the circular motion of the heart proceeding from the arteries.'

The power of the heart is in some measure restrained by the pericardium, and this circumstance ought always to be taken into consideration, both in natural and diseased conditions of the organs.

In respect to the quantity of blood which is transmitted at each ventricular contraction or systole into the arterial system, opinion in some measure varies. Blumenbach estimates the quantity transmitted into the aorta by each contraction of the ventricle at about two ounces, and he supposes that all the blood of the body must pass through the heart seventy-five times every hour. 'That the powers of the heart cannot,' he says, 'be accurately calculated is clear upon reflecting that neither the volume of the blood projected at each pulsation, nor the celerity nor distance of its projection, much less the obstacles to the powers of the heart, can be accurately determined. A rough calculation may be made by taking every probable conjecture together; v. c. if the mean mass of the blood is considered as ten pounds or 120 ounces; the pulsation seventy-five in a minute, or 4500 in an hour; and the quantity of blood expelled from the left ventricle at each contraction as two ounces; it follows that all the blood must pass through the heart seventy-five times every hour.' The mean quantity of blood is however estimated too low by this physiologist. Richerand on the same subject expresses himself in the following terms:—

The quantity of blood which each contraction of the ventricles sends into the aorta and pulmonary artery most probably does not exceed two ounces in each of these vessels. The force with which the heart acts on the blood which it sends into them is but imperfectly known, however numerous the calculations by which it has been endeavoured to solve this physiological problem. In fact, from Keil, who estimates at a few ounces only the force of the heart, to Borelli, who makes it amount to 180,000 lbs. we have the calculations of Michelot, Jurine, Robinson, Morgan, Hales, Sauvages, Cheselden, &c.; but, as Vecy D'Azyr observes, not one of these calculations is without some error, either anatomical or arithmetical; hence we may conclude, with Haller, that the force of the heart is great, but that it is perhaps impossible to estimate it with mathematical precision. If we open the chest in a living animal, and make a puncture in its heart, and introduce a finger into the wound, pretty considerable pressure is felt during the contraction of the ventricles. 'And,' says Blumenbach, 'the impetus of the blood passing from the heart may be conceived by the violence and altitude of the stream, projecting from a large wounded artery, situated near it. I have seen the blood driven at first to the distance of about five feet from the carotid

of an adult and robust man. The experiments of Hales,' our author goes on to say, 'in which the blood was received into very long glass tubes fixed to the arteries of living animals, and the length of the projection measured, are indeed beautiful, like every thing done by this philosopher, who was calculated by nature for such enquiries. But, if the force of the heart is to be estimated in this way, we must take into account the pressure of the volume of blood contained in the tube, and gravitating upon the left ventricle. The result of Hales's calculations was, that the blood being projected from the human carotid to the height of seven feet and a half, and the surface of the left ventricle being fifteen square inches, a column of blood weighing 51·5 lbs. was incumbent upon the ventricle, and overcome by its systole.'

It is sufficiently evident, as indeed the later physiologists have admitted, that vital forces are not susceptible of the same kind of calculations and estimates as those exerted upon inert matter; and that therefore estimates founded upon the analogies of natural philosophy generally must in their very nature be fallacious. It is however at the same time evident that the heart must act with very considerable force in bringing about the circular impetus, even though we admit that it may be much assisted by the action of the vessels themselves. How far these last are instrumental towards completing the process we are presently to investigate; but let us first enquire what it is that excites the heart to contract, and consequently to propel its contained blood? The ancients were satisfied in replying to this question by supposing a pulsific virtue or power in the heart by which it commenced and carried on its actions; and Mr. John Hunter, in later times, talked with but little more precision of 'the stimulus of necessity' exciting the organ to contract. The following are the terms employed to express this idea by the able physiologist whom we have just named. 'The alternate contraction and relaxation of the heart constitute a part of the circulation; and the whole takes place in consequence of a necessity, the constitution demanding it and becoming a stimulus. It is rather, therefore, the want of repletion which makes a negative impression on the constitution, which becomes the stimulus, than the immediate impression of something applied to the heart. This we see to be the case wherever a constant supply, or some kind of aid, is wanted in consequence of some action. We have as regularly the stimulus for respiration; the moment one is finished an immediate demand taking place; and, if prevented, as this action is under the influence of the will, the stimulus of want is increased. We have the stimulus of want of food, which takes place regularly in health, and so it is with the circulation. The heart, we find, can rest one stroke, but the constitution feels it; even the mind and the heart are thereby stimulated to action. The constant want in the constitution of this action in the heart is as much as the constant action of the spring of a clock is to its pendulum, all hanging or depending upon each other.'

We have above called this mode of accounting for the systole and diastole of the heart, its alternate and unceasing contraction and dilatation, a vague one, not out of any disrespect to the great physiologist who has proposed it, but on the ground of its being merely a substitution of words for things, and a confounding the notion of final and efficient causes—a mistake which pervaded the reasonings of the ancients when they discussed the question of qualities and powers, but which ought not to have disfigured the otherwise masterly speculations and philosophising of Mr. John Hunter; and we are the rather disposed to dwell upon the error, inasmuch as there may be a disposition to receive it proportioned to the merit of the person propounding it. We are not indeed alone in our severity of comment in the present instance. We recollect being struck some twenty years since with the same kind of objection we are now urging to language of this kind, in Dr. Beddoes's preface to Brown's Elements of Medicine; and in an able book which now lies before us we meet with the following remarks on the doctrine of 'the stimulus of necessity.'

'Mr. Hunter's Treatise on the Blood is a work,' says Dr. Mason Good, 'of such sterling merit, so rich in facts, and so valuable in its remarks, that, notwithstanding a few nice spun and chimerical speculations that occasionally bewilder it, there is no book on physiology which the student ought to study more assiduously. Yet I am much afraid that the language now read,' alluding to the quotation we have above made, 'has no great deal of meaning in it; and that it does little more than tell us that the heart contracts because it does contract, or, rather, that the circulation takes place because it takes place.'

But the question recurs, what is the immediate or efficient cause of the heart's perpetual, or rather alternate, motion? Some have ascribed this to the stimulus of the blood acting upon the peculiar irritability of the heart; some to the excitement of the nervous system; and others to a vacuum taking place in the cavities, into which, according to the common laws of derivation, as it has been expressed, a vacuum takes place, and, blood thus rushing in, a contraction necessarily occurs to prevent over distension.

It would seem fair to infer that no one single principle can be looked up to as the sole source of the phenomenon in question, and that those who are busily employed on the one hand to prove that it is the stimulus of the blood, and on the other that it is that of the nerves, are both right and both wrong. Oxygen, as the universal excitant, was the favorite dictum of some physiologists soon after the pneumatic doctrines of animal life came to be propounded; but, as will be seen in the chapter on *Respiration*, a great deal had been taken for granted in reference to the reception of oxygen into the blood, or its absorption by that fluid, which subsequent experiments and reasonings have in some measure invalidated.

Perhaps the account given by Blumenbach of the rationale of the heart's action is as simple and satisfactory as any that has been offered. We shall therefore use the freedom of extracting it,

together with the comments of his able translator and annotator.

'The wonderful and, while life remains, constant strength of the heart is universally allowed to depend upon its irritability, in which it very far surpasses, especially as to duration, every other muscular part.

'That the parietes of the cavities are excited to contraction by the stimulus of the blood is proved by the experiment of Haller, who lengthened at pleasure the motion of either side of the heart by affording it the stimulus of blood for a longer period than the other.

'And yet,' says Dr. Elliotson, in remarking on this passage, 'the heart of frogs contracts and relaxes alternately for a length of time when out of the body and destitute of blood.' And he alludes further to the experiments of Mr. Brodie, who divided the great vessels in rabbits, and found the action of the heart 'apparently unaltered for at least two minutes after that viscus and the great blood vessels were empty of blood.' 'But the quantity of blood,' our commentator very properly adds, 'greatly influences the action of the heart.'

Blumenbach goes on to say, 'The great influence of the nerves over the heart is demonstrated by the size of the cardiac nerves, and by the great sympathy between the heart and most functions, however different. A convincing proof of this is the constant sympathy of the heart during the most perfect health with all the passions and with the primæ viæ in various disorders.

'The great importance of blood to the irritability of the heart is evident from the great abundance of blood vessels in its muscular substance.

'Nevertheless it is very probable that the importance of the nerves in this respect is greater in the voluntary muscles, and of the blood in the heart.

'Besides these two powers of the heart there is another which is mechanical, dependent upon structure, and contributing greatly in all probability to sustain the circulation. For, when the blood is expelled from the contracted cavities, a vacuum takes place, into which, according to the common laws of derivation, the blood from the venous trunks must rush, being prevented by means of valves from regurgitating.'

As the principle of vacuum to which Blumenbach here alludes will be found an important one, especially in the connexion which the respiratory has with the circulatory process, we shall further extract the remarks of Dr. E. on the text of his author, in reference to this point. 'The influence of the vacuum pointed out by Rudiger, enlarged upon by Dr. Andrew Wilson, and mentioned as probable by Haller, John Hunter, &c., has been very ably displayed by Dr. Carson of Liverpool. The quantity of blood, the length of its course, and the various obstacles opposed to its progress, render, in his opinion, the mere propulsive power of the heart insufficient to maintain the circulation perpetually. But assistance must be given by the vacuum, which takes place in all the cavities of the organ when the contraction of the muscular fibres is over. The blood is thus drawn into each relaxed cavity, and the heart performs the double office of a forcing and a suction pump. The situation of the valves of the heart is thus explained:—There are valves between the auricles and ventricles, and at the mouths of the two great arteries, because behind each of these four openings is a cavity of the heart, alternately dilating and affording a vacuum into which, were there no valves, the blood would be drawn retrograde. At the venous openings of the auricles no valves exist, because they do not open from a cavity of the heart—from a part ever experiencing a vacuum; and, therefore, the blood cannot, when the auricles contract, move retrograde, but will necessarily press forward into the ventricles, which at that moment are offering a vacuum.'—'All allow that, when the heart is relaxed, its cavities enlarge, though some ascribe this to its elasticity, and others regard it as a necessary consequence of the arrangement of its fibres. Experiment proves the same. Dr. Carson extracted the hearts of some frogs, and immediately put them into water, blood warm. They were thrown into violent action, and upon some occasions projected a small stream of a bloody color through the transparent fluid. The water could not have been projected unless previously imbibed. It was thought that a stream of the same kind continued to be projected at every succeeding contraction, but that after the first or second it ceased to be observable in consequence of the fluid, supposed to be imbibed and projected, losing its bloody tinge, and becoming transparent, or of the same color with the fluid in which the heart was immersed. The organ was felt to expand during relaxation—a fact stated long ago by Pechlin.'

A vacuum, in some way or other, or in some part or other, produced as one of the principles connected with circulating agency, is contended for by several physiologists. Dr. Barry has recently referred this vacuum to the respiratory process in a manner different from Dr. Carson, and we have just been looking over a paper in the Lancet, which attributes it to the repeated closing of the glottis; but we must not allow ourselves to proceed at present further into this enquiry, but go on to the consideration of another disputed point, viz. whether this projectile force of the heart, connected with its properties of suction, supposing them to exist, be sufficient to convey the blood the whole round of its circuit, or whether the vessels through which it flows are at all, or to what extent, auxiliary forces; whether, in other words, the arteries and veins are mere conduits, or whether any share is contributed by them to the propulsion of the blood.

Dr. Harvey, the great discoverer of the circulation, supposed the whole projecting power to reside in the heart, in which opinion he has been followed by physiologists of much note; and indeed the doctrine of the passivity, in some measure, of the arterial tubes has recently been revived, and ably defended by Parry and others. The reader, by turning to the article Anatomy, will find that the coats of arteries have been described as consisting partly of muscular fibres; but it is contended by many that muscularity is erroneously conceived to appertain to these fibres, since they are destitute of fibrine, and do not contract upon the application of

those stimuli which invariably produce this effect upon true muscular substance. It is further maintained that the alternate contractions and dilatations of arteries, in the manner just described as the actions of the heart, have never been proved even by those physiologists who award to them an independent and active power. Further, it is urged that a function so orderly and regular as that of the circulation cannot well be supposed obnoxious to those casualties which would be likely to arise out of a separate and independent action in the several conduits conveying the blood. The utmost power then that these philosophers award to the arteries is that of elasticity, and, as it is termed, tonicity, by which the dilatation from the impetus of the blood is kept within due limits, and thus the current maintained. These arguments are strengthened by allusions to diseased conditions. Bichat, for instance, whose theory of the circulation denies the abstract action of the arteries, remarks that all irregularities in the course of the blood imply a disordered condition of the heart itself, while the arteries may be ossified, to a very considerable degree and extent, without occasioning any disturbance. Some indeed have gone so far as to deny that, in the structure of the arterial tubes, any thing can be found that bears the remotest resemblance to muscle; thus Mr. Hare, in his work on the stomach, expresses himself in the following terms:—'Having sought in vain for the reputed muscular coat of an artery, I am led to conclude that the whole tube is constructed of cellular tissues, which, from its different degrees of density or compactness, appear to form separate coats; and which from its yielding power is fitted for all the purposes of circulation by the impulse which the blood receives from the heart alone, the great muscular power of which appears more than sufficient for propelling it through elastic tubes to all parts of the body.'

Those philosophers who defend the opposite doctrine, viz. that the arteries contract and dilate alternately, as does the heart, and thus assist in the circulation beyond the mere reception and transmission of blood, allege that the inference respecting the absence of muscularity in arteries, from their deficiency in fibrin is fallacious; since muscles themselves will sometimes resist all stimuli, excepting that of their specific or peculiar excitant. 'It would be too much,' says Mr. Charles Bell, who has written a very ingenious tract on the Circulation, 'to infer that the iris is not muscular because it does not act upon being pricked. We see that the heart, after it is exhausted and refuses to act whatever stimulus be applied, will contract when it is distended; because distension is its natural excitement. For the same reason an intestine will revive and act upon being distended with air, though it will not act upon being pricked with needles.' Arteries then, notwithstanding they are destitute of fibrin, may, it is argued, be provided with a faculty tantamount to positive muscularity when urged to action by their appropriate stimulus.

To the position above announced, that the contractions and dilatations of arteries have never been demonstrated, it is replied that the branches of vessels which have been laid bare and exposed to view for the purpose of ascertaining this point are not sufficiently large for their actions to be thus detected. 'The carotid artery,' says Mr. Bell, 'is six inches in length, and only half an inch in diameter; it elongates at each contraction of the heart a quarter of an inch, and of course rises in its bed in a curve to accommodate itself to its confined place. Suppose then (he adds) that it dilates in breadth in proportion to this elongation, should the dilatation be visible to me?'

Then again an argument is adduced on this side of the question from the difficulty of conceiving that such a small apparatus as is the heart should be equal to propelling the innumerable currents of blood at so many different angles, through many tortuous courses, contrary to the action in several cases of gravity, and under different circumstances external and internal of the body, to every portion of the system.

These systematists further argue that topical augmentation in arterial movements, in consequence of local excitation, is totally inconsistent with the notion that the alternate contraction and dilatations of the heart are the sole source of the blood's impetus.

But even admitting, it is said, that this local excitation might occasionally take place, consistently with the general passibility of the arterial tubes, how can we account without the assumption of positive, independent, arterial power, 'for sudden increase and diminution of secretion, for sudden and partial growth, for wasting and decay of parts while the general body is vigorous, for an organ being plentifully supplied with blood one hour, and the next left with a diminished quantity?' Further, say the objectors to the Harveyan and Parryean doctrine, 'to suppose that the heart is the only engine of circulating the blood, or even that it is the principal cause of the blood's motion, must leave us in perfect astonishment when we see it ossified in its substance, or encompassed with a tumor which surrounds it wholly, and adheres to it on all sides.'

But the principal difficulty which the hypothesis in question has to encounter would seem to be constituted by the circumstances connected with capillary circulation; especially in those structures which appear in some measure different from the mere termination of the arteries into small capillary tubes. It has already been said that other terminations of these vessels have been supposed, although, perhaps, not demonstrated: indeed, in some instances, it is difficult to account for the blood's entrance and exit without the admission of a species of extravasation, as in the case of the placenta, where the blood would appear to be thrown out into a sort of cellular structure, and taken up again into the venous system by a species of imbibing power. In these examples, then, and indeed in the mere interchange of blood from the capillary order of arteries to that of the veins, it seems difficult to account for the manner in which the blood finds its way into the radicles of the veins; if we suppose the whole of circulating agency to resolve itself into the momentum, or rather impelling power, of the heart; indeed, on either supposition

or hypothesis, there appears much difficulty in tracing the blood through the capillary system of arteries, and into the capillaries of the veins, without assuming some imbibing or absorbent faculty on the part of the latter; whether that faculty be exerted at the heart itself, in the way intimated when we were considering the heart's action, or whether it be assisted by a power and principle of suction in the commencing extremities of the venous ramifications. We are told indeed, and told truly, that injections thrown forcibly into the arteries of a dead subject will be propelled on into the veins; but the mechanical powers which are manifested upon the extinction of the living principle must of course, to say the least, be much modified by the presence and agency of life.

It ought to be remarked that those individuals who deny the alternate contraction and dilatation of the arteries do not exactly defend their passivity; indeed the term tonicity, which Dr. Parry applies to express arterial condition, is inconsistent with such notion: all that they, at least most of them, mean to say in defence of the heart as the propelling power is this, that this power throws the blood into tubes, which, by their elasticity, open for its reception, and that this elasticity is prevented from acting beyond a certain measure by the structure of the vessel itself; so that the jet of blood which spirts out per saltem, as physiologists express themselves, upon a wound made into a large artery, is not so projected because the vessel from which it immediately proceeds acts and reacts, or rather contracts and dilates, as does the ventricle of the heart itself, but that the successive streams are caused by the contraction and relaxation of this last organ.

In the capillary system, even of the arterial tubes, this kind of motion is lost, the blood in the very small vessels flowing in an equal stream; and this circumstance is made use of in illustration and support of the principle to which we now refer; inasmuch, it is said, as the influence of the heart now becomes in a great measure lost: and although here the artery still does not lessen and enlarge, or dilate and contract, as does the organ from which all the blood issues, the power of the artery over its contained blood is now less dependent upon the heart's force, and the blood therefore flows more in the way of continued stream; still, however, dependent upon the impulse at the source and centre of circulation.

Anatomists, who admit of the fibrous coat of the artery, describe the capillary tubes as having these fibres in much larger proportion to the elastic tunic than is the case with the larger arteries, and this construction seems in harmony with the supposition now adduced, that in the vessels, and those more immediately under the control of the heart, elasticity is a principle mainly called into exercise; while contraction and propulsion are the agencies demanded from the capillaries.

It is a question in our minds whether both the advocates for and against the systole and diastole of the arteries may not, in some cases, have pushed their positions and arguments under too great a forgetfulness of vital powers and vital propulsions being differently governed from tubular machinery, and conveying conduits not endowed with the living principle. We have, therefore, been much pleased in meeting with the following remarks by Dr. Copland in his notes upon Richerand's Physiology, which, entirely coinciding with our own views on circulating impulse, we shall take the liberty of transcribing into our pages. Dr. Copland is remarking on some positions respecting the blood's motion made by Magendie, and he expresses himself as follows:—

'The arteries throughout the body are surrounded by the ganglial nerves. These nerves form a reticulum around them, from which reticulum very minute fibrillæ are given off and dip into their fibrous or muscular tunic.

'This particular disposition of the ganglial nerves on the arteries ought to be kept in recollection when we enquire into the functions of the latter. How far it tends, not only to the discharge of the more manifest action which the arterial system performs, but also to those insensible changes which the blood undergoes in health and disease, and to the assimilation of chyle and other absorbed materials conveyed into this fluid we have ventured to state at another place. We shall here merely take notice of an opinion relative to the operation of this class of vessels in the circulation of the blood, lately contended for by M. Magendie. This physiologist has inferred from his researches on the circulation,

'1. That neither the larger nor the smaller arteries present any trace of irritability.

'2. That they are dilated during the heart's systole.

'3. That they are capable of contracting themselves with sufficient force on the blood they contain, so as to propel it into the veins.

'4. That the blood in the arteries is not alternately at rest and in motion; but that it is, on the contrary, in a continued succedaneous (by little jets) motion in the trunks and ramifications, and uniform in the smallest ramifications and divisions.

'5. That the contraction of the left ventricle of the heart, and the elasticity of the larger and smaller arteries furnish a satisfactory mechanical reason for these phenomena.

'6. That the contraction of the heart and arteries has a considerable influence on the course of the blood through the veins.'

'We cannot concur,' says our commentator, 'in these conclusions, especially in the surprising inference which forms M. Magendie's fifth proposition, and we might, were it consistent with our limits, point out various fallacies in his experiments, to some of which, indeed, all experiments on living subjects are more or less liable, viz. the unnatural position of the animal during their performance, and more particularly as respects the operations of the part immediately its subject. (This by the way is a very important intimation, and not sufficiently attended to by some of our experimental physiologists.—Ed.) If M. Magendie limits the process to the mechanical means indicated above, we would ask how he accounts for the influence of mental motions, in determining the action of vessels in particular parts of the body? How the diversi-

fied influences of numerous external agents on the circulation can be explained? Wherefore so very opposite effects are produced upon the arteries when one extremity is placed in a pail of ice, and another in a pail of warm water? How can he reconcile his conclusions with the very satisfactory experiments performed by Sir Everard Home, Dr. Hastings, and others? and how can he account for the determination of blood to particular parts, whilst a diminished quantity is sent to other situations, if he discard the predominant or vital power which the vessels themselves, and especially their smaller ramifications, possess in virtue of the particular structure already noticed? We readily grant that the larger branches of arteries evince little or no contractile action, particularly in their natural state; but we contend that it increases as we advance towards the extreme capillaries, the action of which drives the blood to them in larger proportion, and thus increases both the mechanical and vital properties of the larger branches supplying them.

'We allow that the properties for which M. Magendie contends have an actual place in the process of arterial circulation; but they are not the only ones: they are insufficient of themselves to accomplish the purpose he assigns to them; and, moreover, they are secondary to, and controlled by, a superior influence.

'From these observations it may be perceived that the arteries act in the process of the circulation, not by means of contractile action similar to what is performed by the heart, nor yet by means of elasticity only, but by an organic or vital operation, which is nearly imperceptible in the larger branches, but which increases as we advance to the extreme capillaries; whilst on the contrary the elastic or mechanical properties augment as we proceed in the opposite direction.'

This last sentence of Dr. Copland seems to us to contain as much truth, or rather correctness, with respect to the rationale of arterial and cardiac impulse, as any that we have met with; but still it remains to be enquired by virtue of what influence the refluent part of the circulation, if we may so express it, is brought about? It has been already intimated that, without supposing a sort of imbibing power in the radicles of the venous capillaries, it is difficult to trace in idea the mode of interchange between the arterial and venous ramifications; especially when we take into account that in some spongy or cellular structures, there would appear to be a sort of extravasation of blood, or a throwing of it out from the termination of one system of vessels to be taken up again by another. But even allowing that something of this power is exerted at the extremities it still remains to be questioned how the blood is urged in a continued stream often against the force of gravity, and in many instances with other impediments, on to the auricle and ventricle of the heart? Here again we are brought to determine on the problem of the heart's power, but the power in this last case, as, indeed, we have before said, must be of a kind opposite to that of propulsion. On this head, perhaps, mechanical analogies have been too freely allowed to mingle with our reasonings, and vital peculiarities too much overlooked; but here we shall let another ingenious author express himself.

'It yet remains,' says Dr. Mason Good, after discoursing on arterial circumstances, 'It yet remains to account for the second half, or that which consists in the passage of the blood through the veins; and upon this subject there is one most important and elucidating fact which till of late has never been in any degree brought forward in the course of the enquiry. It is this, that when the heart, by the contraction of its ventricles, has exhausted itself of the blood contained within it, a comparative vacuum must follow, and the blood from the venæ cavæ, or venous system at large, be sucked up into the right auricle. This ingenious remark seems just to have been thrown out by Dr. Wilson Philip; and Dr. Carson of Liverpool, taking advantage of it, has constituted a simple and beautiful theory of the projectile powers employed in the circulation, the general principle of which may be expressed in a few words. The heart is supposed to act at one and the same time in a twofold capacity. By the contraction of the ventricles it propels the blood through the arteries; and by the dilatation of the auricles it draws it up from the veins. It is at once, therefore, a forcing and a suction pump. The contraction of the heart, and consequently its comparative vacuum, are supposed to be considerably assisted by the elasticity of the lungs and the play of the diaphragm, and the joint resistance which these afford to atmospherical pressure; whilst this very pressure, applied on every part of the exterior of the animal frame, continues in an equal degree to the ascent of the blood in the veins; for as the column of venous blood is perpetually girt on all sides, and cannot fall back because of the numerous valves with which the veins are furnished, it must necessarily take an opposite or ascending direction.

'There are, nevertheless, numerous difficulties that still remain to be explained, such as the proportion of projectile power furnished by the conducting pipes themselves; by what means the want of a diaphragm is compensated in birds and reptiles which have no such organ; and what constitutes the projectile power in animals that have no heart, and consequently no double pump to work with.'

Dr. Good might have added to these objections the circumstances which are exhibited in vegetable physiology, the rise and descent of the sap of plants, &c., which appear to be effected somewhat upon the same principles as the motion of the blood in the animal economy, and which, being obviously insusceptible of all the reasoning applied to the explanation of the latter upon mechanical predicates, must be referred to vital or organic laws.

'There is another curious fact which physiology has pointed out, but has never hitherto been able to explain, and that is, a direct communication between remote or unconnected organs apparently by some other channel than the circulation of the blood. Something of this kind seems to exist between the spleen and the stomach, the former of which has been proved by Sir Everard Home to receive fluids from the

cardiac portion of the latter, though we can trace no intercourse of vessels. But the most extraordinary example of this kind which at present we seem to possess is the communication which exists between the stomach and the bladder; for the experiments of Sir Everard Home (Philosophical Transactions 1811, page 63), and the still more decisive ones of Dr. Wollaston and Dr. Marcet (Philosophical Transactions, p. 96) seem to have established beyond a controversy that certain substances introduced into the stomach, as rhubarb or prussiate of potassa, may pass into the bladder without taking the course of the blood vessels, and consequently by some other channel; a channel, indeed, of which we know nothing. This is a subject well worth studying; for if two organs, so remotely situated as the stomach and bladder, be thus capable of maintaining a peculiar intercourse, so other organs may possess a like intercommunion, and by such means lay a foundation for those numerous sympathies between distant parts which so often strike and astonish us. M. Magendie's hypothesis, that veins are absorbents, will explain the facts in Sir Everard Home's experiments, but has no bearing upon those of Dr. Wollaston and Dr. Marcet.

To this important fact in the animal economy we alluded when considering the subject of absorption; we now proceed to make some mention of the pulse which has a manifest connexion with the circulating impulse, but the mode and measure of which connexion, seem still in some degree sub judice points.

Upon what, let us ask of ourselves, does pulsation depend? Is it produced by the alternate contractions and dilatations of the arteries themselves? or is it the consequence of the heart's systole and diastole? does it depend upon the column of blood forcibly and momentarily, or at least in momentary succession, striking against the sides of the vessels and thus distending them? or is it a combined effect of all these circumstances and principles taken collectively?

That arterial contraction is not the cause of the pulse is proved by the fact that the beat of the vessel is felt, not at the moment of contraction, but dilatation; and let it be noticed that this arterial dilatation is not simultaneous with the dilatation of the heart, but is affected at the moment of the heart's contraction. We should be therefore probably correct in saying that the pulse is rather the consequence of an impulse communicated to the vessel by that portion of blood which is propelled into the arteries from the heart coming into contact with the antecedent columns; and that being resisted in some measure by the blood already in the vessel, it is thus forced against its sides and communicates to them their pulsatory motion. It may be easily conceived that something of the same kind would be effected upon a set of elastic pipes, even destitute of the living principle; were an injection in this successive way of a fluid to be made into them, the dislodgment of one column of fluid for the reception of another would be attended with that sort of pulsatory expansion which arterial dilatation produces.

In the capillaries and in the veins this projectile motion becomes lost; and hence, in these, the blood, as we have before said, is carried on more in the way of a continued stream, and no pulse or comparatively but little is felt in them. And in these last we may, by the way, remark that the circulation becoming more independent upon the heart itself, and more dependent upon other powers, exercise of the body, friction, and muscular contractions, however produced, assist the capillary and venous circulation in a marked degree: the pulse indeed is itself affected by these assistants to the circulatory impulse; but it is so rather in an indirect than immediate manner, since what throws more blood upon the heart must, cæteris paribus, cause greater and more powerful contractions of that organ, and of course greater and more powerful impulses upon the large branches of the arteries in which the pulse is felt.

On the differences of the pulse as constitutional, or characteristic of health on the one hand and disease on the other, it is scarcely within the province of physiology to descant; but a few remarks may be admitted here on this head as not altogether out of place.

We cannot but remark the difference of sentiment which has obtained among medical men on this subject: some asserting that there is neither ground nor necessity for a recognition of any difference in the pulsations as marking different conditions of the system further than the mere number of them; while others have divided and subdivided to a most whimsical extent. The truth in this case, as indeed in most other points that are controverted, would seem to be at some distance from either extreme, although we rather incline to think that those physiologists and pathologists who think more of number than kind are the nearest to the truth.

But on the nature and general doctrine of pulsation we have met with nothing more accordant with our own sentiments than the remarks which Dr. Mason Good has prefixed to one of the sections of his book entitled The Study of Medicine.

'The variations of the pulse have been ramified into so many divisions and subdivisions, and nice unnecessary distinctions, as to puzzle the young and be of no use to the old; and hence some of the best pathologists of modern times have been too much disposed to shake off nearly the whole of the incumbrance, and pay no attention whatever to the pulse except in regard to frequency. Among this number was Dr. Heberden; 'such minute distinctions of the several pulses,' says he, 'exist chiefly in the imagination of the makers, or at least have little place in the knowledge and cure of diseases. Time, indeed, has so fully set them aside, that most of those names of pulses are now as unheard of in practice as if they never had been given.'

'But this is to limit the subject to too strict a boundary, and to exclude ourselves from what, in many instances, are clear and even leading diagnostics. There are some practitioners, and of very high merit too, whose fingers are no more capable of catching the finer distinctions of the pulse than the ears of other persons are of the niceties of musical sounds. I suspect this was the case with Dr. Heberden, as it was also with the late Dr.

Hunter; of whom Mr. J. Hunter observes that, though he was extremely accurate in most things, he could never feel that nice distinction in the pulse that many others did, and was ready to suspect more nicety of discrimination than can really be found.'

'Dr. Fordyce's table of the pulse,' continues Dr. G., 'is perhaps unnecessarily complicated; but the strength or weakness, fulness or smallness, hardness or softness, regularity or irregularity, of the pulse are indications nearly as clear as its frequency or slowness, and in many cases quite as diagnostic of the general nature of the disease. Frequency and slowness of pulse taken by themselves indicate little more than the degree of irritability of the heart, or the force of the stimulus that is operating upon it. The strength and regularity, or weakness and irregularity, of the pulse are as palpable to the finger as the preceding signs, and show in characters nearly as decisive the degree of vigor or debility of the heart, and hereby, except where this organ is laboring under some local affection, the vigor or debility of the system which a mere variation in the state of the frequency of the pulse will not tell us. A full and a small pulse may be distinguished with almost as much ease as any other property it possesses; this Mr. John Hunter ascribed to the state of the arteries; but if I mistake not it gives us rather a measure of the quantity of blood circulating through the system than of the muscular strength of the arteries or of the heart itself. Hardness and softness of pulse, together with that vibrating thrill which has been called windiness, are not quite so easily learned as its fulness and smallness, but a nice finger will readily discriminate them. Dr. Fordyce makes them dependent, and I think with great reason, on the state of the arteries, rather than that of the heart, or on the quantity of the circulating fluid; and Mr. John Hunter concurs in the same view. They measure the degree of vascular tone or power of resistance; and when the same effect, whether above or below the natural standard, takes place in the capillary arteries, it produces that change in the pulse which he distinguishes by the name of obstruction and freedom, but which it is not always easy to discriminate from several of the preceding qualities.

'Thus far,' continues our author, 'the doctrine of pulsation may be studied to advantage; but when beyond this we come to a distinction between the free and dilated pulse, as proposed also by Dr. Fordyce; the quick and the frequent as proposed by Stahal; and the dicrotic, and inciduous, proposed by Solano as mere subvarieties of the rebounding or redoubling—itself a variety of the irregular pulse—we perplex pathology with a labyrinth in which the student is lost, and the master wanders to no purpose.'

Dr. Good has other remarks on the subject under discussion, but it is not the purpose of the present paper to go into pathological disquisition, and we have only ventured so far as we have under the feeling that the mind, being called a little to the modes in which variation may be manifested, is thereby assisted in judging of the natural condition of the powers that are the subjects of investigation; if, for example, the fact of the hard pulse be admitted, or that which gives a jar to the finger which presses the artery, the admission leads to the question and consideration of how far the tunics of the vessels themselves may influence the circulating impulse without reference to the beats of the heart. An elastic and fibrous power is, as we have seen, awarded by most physiologists to the arteries, while others have contended that these envelopments are merely membranous. Now, if we can detect a condition of the moving power which indicates a sort of opposition—which seems to say that elasticity is too soon and readily interfered with by contractility—we go some way towards settling the disputed point. Whether a hard wiry pulse does not manifest this intention, as it were, may be left for the readers' reflections to determine.

We should not do right in closing this section of our treatise without adverting more distinctly than we have hitherto done to the opposition which the blood has to meet with in pursuing its free course through the body; and to the question how far circulatory impulse is under the influence of powers exterior to the body.

We may first remark that the impulse of the circulating energy has to contend with the larger diameter of the general mass of the arteries, compared with that of the central source of circulation; this range of diameter augmenting, as it has been expressed, in proportion to the increase of the ramifications. It has indeed been stated that the aggregate diameter of the arterial system forms a cone, the apex of which is the heart.

Then again 'the short angles against which the blood has to strike, at the origin of the different branches,' must necessarily constitute a greater call upon the projectile force of the powers concerned in the circulation and the tortuous course that some of the arteries take, more especially those which enter the brain; though some physiologists have doubted whether this last circumstance can in any way operate towards resistance or impediment. Mr. Charles Bell, we recollect, expresses this doubt; but, though his objections to the principle may be ingenious, we should feel a reluctance in admitting any objections to a construction the final cause of which seems so apparent. In the case, for instance, of the bending and winding of the main artery which supplies the brain, it is almost demonstrative that this is a provision by nature against sudden impulses upon an organ which is so obnoxious to injury from these inordinate rushes of blood.

Natural gravity is another power which the circulation has in some measure to oppose, since the direction of the coming branches is upwards and lateral, as well as downwards and forward; and it has been supposed by some that the friction against the sides of the vessel is a source of impediment to freedom of propulsion.

Sufficiently obvious is it then that the force which has to meet and encounter these obstacles must not only be great but peculiar—by which last expression we mean that all calculations on mechanical and hydraulic principles, and

that do not take into account vital causation and impulse, must necessarily be erroneous; although to a certain degree they apply, and in this modified or subordinate way do we find exterior influence operate upon the functions now under notice.

By density and rarity in the air—by the degree of atmospherical moisture or dryness—by different positions of the body—by changes in external temperature—by a greater or less fulness of the vascular system—by exercise or rest, &c., is the circulating impulse in some measure modified, while on the other hand the vital forces concerned in the phenomenon counteract these agencies to a very considerable extent. But to go into these principles and peculiarities would carry us beyond our limits, and we should besides be trespassing too much upon the province of pathology by discussing them to any extent. See MEDICINE.

ON RESPIRATION, &c.

The respiratory function has so obvious a connexion with that of the circulation that it seems especially in order to treat of one in immediate succession to the other; and, under this view of the dependence which the powers that move on the blood have upon the air which is taken into the lungs, it may be right to advert in the first instance to those speculations which have been thrown out as to the manner in which this relationship is maintained between the one and the other function. Having thus treated of the process of breathing, as connected with the circulation, we shall then advert to some other purposes which the organs of respiration are more immediately destined to effect;—more immediately, we say, because there is scarcely a function in the whole of the organised body upon which the inhalation of air by the lungs has not some, more or less, remote influence; for digestion, assimilation, secretion, nutrition, even the sentient system, and its various affections; and, in fine, every principle and property of the living machine, is interfered with by impediments or obstructions to the free play of the lungs and their appendages. When, then, we talk of the more immediate or direct purposes and dependencies of the pulmonary system, we mean to confine ourselves to the influence of breathing upon the blood; its composition, qualities, and mode of action; and to the furnishing of those communications and interchanges of sentiments and ideas which audible, and in the human frame articulate, sounds, are the media of.

'The respiratory function,' says Dr. Good, 'is maintained by a current of air alternately thrown into and out of the chest, and is subservient to two important purposes; that of furnishing us with speech, or the means of vocally communicating and interchanging our ideas; and that of carrying off from the blood a gas recrementary and deleterious to life; and, possibly, of introducing in its stead one or more gases indispensable to animal existence. Now, without the change thus effected upon the blood while it circulates through the lungs, the motion of the heart would soon cease altogether; and therefore it is that we say the circulatory has such a manifest connexion with the respiratory process.'

The structure of the lungs, their connexion with the trachea or air passages, and the mode in which the organs are supplied with blood, will be found described in the article ANATOMY. The organs thus constructed, and thus connected, are destined, from the moment that an infant becomes separated from its maternal attachment, to receive and expel a certain quantity of air; how this inspiration and expiration, which must continue while life continues, are brought about, does not seem very easy to be explained; some ascribing the commencement of respiration to one cause, some to another.

'The ordinary cause,' says Dr. Elliotson, 'of the first inspiration, appears to be the novel impression of cool air upon the surface; for if at any time we are suddenly exposed to a cold wind, or plunged into cold water, the diaphragm and intercostal muscles instantly contract, and a sudden inspiration takes place. The blood rushes into the expanded lungs, and, being afterwards obstructed when the inspiratory muscles seem to act and the elastic lungs shrink, gives rise to an uneasy sensation, which is instinctively removed by another inspiration, and thus respiration continues through life.' The fact of respiration commencing before the chord is tied shows that neither congestion in the aorta, nor deficiency of chemical changes, is the cause of the first inspiration. If an animal is born under warm water, its respiration begins at the moment you choose to bring it up into the air. Buffon proved this by causing a bitch's accouchement to take place in a tub of warm water, and allowing the pups to remain there for half an hour. The power of excitement of the surface to cause inspiration has been recently shown by Bichard and others, who, on mechanically irritating fœtal kittens still enclosed in the membranes, found inspiratory efforts take place at each irritation.'

The following extract from Dr. Darwin, on the subject of respiration, gives a somewhat different account of its primary cause. 'Respiration,' says this physiologist, 'is immediately caused by the sensorial power of sensation, in consequence of the baneful want of vital air, and not from the accumulation of blood in the lungs, as that might be carried on by inhaling azote alone, without the oxygenous part of the atmosphere. The action of respiration is thus similar to the act of swallowing our food to appease the pains of hunger; but the lungs being surrounded with air, their proper pabulum, no intermediate voluntary exertions are required, as in hunger, to obtain and prepare the proper material.'

Blumenbach's views of the primary source of respiration are expressed in the following manner:—'When the child is born, and capable of volition, the congestion of blood that takes place in the aorta from the obstruction in the umbilical arteries; the danger of suffocation, from the cessation of those changes in the blood in regard of the oxygen and carbon; the novel impression of that element into which the child, hitherto an aquatic being, is conveyed, the cooler tempera-

ture to which it is now exposed; and the many new stimuli which are now applied; seem to induce new motions in the body; especially the dilatation of the chest, and the first inspiration.'

Of these accounts we rather prefer the last, as it seems to explain the phenomenon by referring to several particulars, rather than aiming to seize hold of one principle and source; an error which reasoners are apt to be led into from their natural wish to generalise. But, after all, these functions seem rather referrible to the laws of organisation than susceptible of explanation by any of these appeals to final cause: there is no stimulus of pain required to set going the first actions of individuals in the vegetable creation; and the chord is separated, and inspirations commence, in some animals of the mammalia class, without any expression which denotes uneasy feeling. But it must be granted, in favor of our theorist, that crying seems as natural to a child from its birth, as the birth itself.

Upon whatever principle, however, the commencement of respiration is to be explained, certain it is, as Dr. Darwin has stated, that the process continues to proceed through life, without the intervention of sensation; and we now proceed to present the reader with an account of this process from one of our most able physiologists, Dr. Richerand.

In man, and all warm-blooded animals with a heart containing two auricles and two ventricles, the blood which has been conveyed to all the organs by the arteries, and which has been brought back by the veins to the heart, cannot return to it without having previously passed through the lungs, which are viscera destined to the transmission of the air, of a spongy texture, and through which the blood must of necessity circulate to get from the right to the left cavities of the heart. This course of the blood constitutes the pulmonary or lesser circulation; it does not exist in some cold-blooded animals. In reptiles, for instance, the heart has but one auricle and one ventricle; the pulmonary artery in them arises from the aorta, and conveys but a small proportion of the blood; hence the habitual temperature of these animals is much lower than that of man. For the same reason too there exists so small a difference between their venous and arterial blood, the quantity of fluid vivified by exposure to the air in the pulmonary vessel being too small to effect, by its union with the general mass, a material change on its qualities.

Mayow has given the most accurate notion of the respiratory organ, by comparing it to a pair of bellows containing an empty bladder, the neck of which, by being adapted to that of the bellows, should admit air on drawing asunder its sides. The air, in fact, enters the lungs only when the chest dilates and enlarges by the separation of its parietes. The agents of respiration are therefore the muscles which move the parietes of the chest; these are formed of osseous and soft parts, in such a manner as to possess a solidity proportioned to the importance of the organs which the chest contains, besides a capacity of motion required to carry on the functions entrusted to them.

To carry on respiration, which may be defined the alternate ingress of air into the lungs and its egress from those organs, it is necessary that the dimensions of the chest should be enlarged (this active dilatation of the cavity of the chest is called inspiration), and that it should contract to expel the air which it had received during the first process. This second action is called expiration; it is always of shorter duration than the former; its agents are more mechanical, and the muscles have less influence upon it.

In health the chest dilates only by the descent of the diaphragm. The curved fibres of that muscle, strengthened in contraction, descend towards the abdomen and compress the viscera. The descent of the viscera thrusts forward the anterior parietes of that cavity, and these recede when on expiration taking place after inspiration the diaphragm now relaxed rises, pressed upward by the abdominal muscle, compressed themselves by the large muscles of the abdomen. But, when it is necessary to take into the chest a great quantity of air; it is not sufficient that it should be enlarged merely by the descent of the diaphragm, it is required besides that its dimensions should be increased in every direction. The intercostal muscles then contract, and endeavour to bring together the ribs, between which they are situated. The intercostal spaces, however, become wider, especially at their anterior part; for whenever lines, falling obliquely on a vertical line change their directions, approaching to a right angle, the intermediate spaces receive the greater increase, as the lines, more oblique at first, become at last more nearly horizontal. Besides, as the ribs are curved in the course of their length in two directions, and both in the direction of their faces, and edgewise, the convexity of the first curvature is outwards, the ribs recede to a distance from the axis of the chest, whose cavity is enlarged transversely; while the second curvature (on the direction of their edge) being increased by a real twisting of these bones, and which reaches to the cartilaginous parts, the sternum is heaved forwards and upwards, so that the posterior extremity of the ribs is removed from their sternal end. But as the ribs are not all equally moveable, as the first is almost always invariably fixed, and as the others are moveable in proportion to their length, the sternum is tilted in such a way that the lowermost extremity is thrust forward. The diameter of the chest from the fore to the back part increases, therefore, as well as the transverse diameter. This increase of dimensions has been estimated at two inches to each of these diameters; the dimensions of the vertical diameter, which are regulated by the depression of the diaphragm, are much greater.

Professor Sabatier, in his Memoir on the Motion of the Ribs and on the Action of the Intercostal Muscles, maintains that, during the action of inspiration, the upper ribs alone rise, that the lower ribs descend and slightly close on the chest, while the middle ribs project outwardly; and that in exspiration the former set of ribs descend; that the latter start a little outwardly, and that the middle set never act on the cavity of the chest. The learned professor adds, that the cartilaginous articulating surfaces by which

the ribs are connected with the transverse processes of the vertebræ appear to him to favor these different motions, as the direction of the articulations of upper ribs is upward, and that of the lower downward; but on considering the subject with attention it will be seen that the surfaces by which the transverse processes of the vertebræ are articulated to the tuberosity of the ribs are turned directly forwards in the greatest number, some of the lower ribs are at the same time directed slightly upward. If we examine the action of the bones of the chest during inspiration in a very thin person, for example in phthisical patients whose bones are covered with little else than skin, we shall find that all the ribs rise and are carried somewhat outwardly. It is not easy to conceive how the intercostal muscles, which professor Sabatier considers as the agents of respiration, should elevate the upper ribs and depress the lower. The diaphragm, whose circumference is inserted in the latter, might by its contraction produce this effect; but, as the intercostals have their fixed point of action in the upper ribs, they oppose and neutralise this effort, and all the ribs are elevated at once. If this were not the case the ribs ought to be depressed whenever the intercostals contract, since the lowermost, fixed by the diaphragm, would become the fixed point on which all the others should move.

As the fibres of the external and internal intercostal muscles are in direct opposition to each other, those of the former set of muscles, having an oblique direction from above downward, and from behind forward, and crossing the fibres of the other set whose obliquity is in a different direction, several physiologists have thought that these muscles were opposed to each other; that the internal intercostal muscles brought together the ribs, after they had been separated by the external intercostals, the one set being muscles of expiration, while the other set contracted during inspiration.

It is well known with what pertinacity Hamberger, in other respects a physiologist of considerable merit, defended this erroneous opinion in his dispute with Haller; it is now, however, ascertained that all the intercostal muscles concur in dilating the chest, and that they ought to be ranked amongst the agents of inspiration, because the unequal capacity of motion in the ribs prevents the internal intercostals, the lower insertion of which is nearer to the articulation of these bones to the vertebræ, from depressing the upper ribs. Of the very conclusive experiments by which Haller undertook to refute the arguments of his adversary, I shall relate only that which is performed by stripping the parietes of the chest, in a living animal, of all the muscles which cover it, and by removing in different parts of the thorax some of the external intercostal muscles. The internal intercostals are then seen to contract during inspiration together with the remaining external intercostals. These muscles, therefore, have a common action, and are not in opposition to each other. The same experiment serves to prove the increased dimensions of the space between the ribs. On holding one's finger between two of the ribs, it feels less confined, when during inspiration these bones rise and thrust forward the sternum.

This question being at rest, although in pursuit of science one should enquire how things are affected and not wherefore they come to pass, one feels naturally desirous to know what purpose is answered by the different directions of the fibres of the two sets of intercostal muscles; and with what view nature has departed from her wonted simplicity in giving to their fibres opposite direction. In answer to this, it may be stated that the action of powers applied obliquely to a lever, being decomposed in consequence of that obliquity, a part of the action of the external intercostals would tend to draw the ribs towards the vertical column, which could not happen without forcing back the sternum if the internal intercostals did not tend to bring forward the ribs, at the same time that they elevate them; so that these two muscular planes, united in their action of raising the ribs, antagonise and reciprocally neutralise each other in the effort by which they tend to draw them in different directions.

To this advantage, of mutually correcting the effects that would result from their respective obliquity, may be added the benefit arising from a texture capable of greater resistance; it is clearly obvious that a tissue whose threads cross each other is firmer than one in which all the threads merely in juxta-position, or united by means of another substance, should lie all in the same direction. Hence nature has adopted this arrangement in the formation of the muscular planes constituting the anterior and lateral parietes of the abdomen, without which the abdominal viscera would frequently have formed herniary tumors by separating the fibres and getting engaged between them. In this respect one may compare the tissue of the abdominal parietes, in which the fibres of the external and internal oblique muscles which cross each other are themselves crossed by the fibres of the transversales, to the tissue of those stuffs whose threads cross each other, or rather to wicker-work, to which basket-makers give so much strength by interweaving the osier in every direction.

When from any cause respiration becomes difficult and the diaphragm is prevented descending towards the abdomen, or the motion of inspiration impeded in any way, the intercostals are not alone employed in dilating the chest, but are assisted by several other auxiliary muscles; the scaleni, the subclavii, the pectorales, the serrati magni, and the latissimi dorsi, by contracting elevate the ribs and increase in more directions than one the diameter of the chest. The fixed point of these muscles, then becomes their moveable point, the cervical column, the clavicle, the scapula, and the humors, being kept fixed by other powers which it is unnecessary to enumerate. Whoever witnesses a fit of convulsive asthma, or of a suffocating cough, will readily understand the importance and action of these auxiliary muscles.

Inspiration is truly a state of action; an effort of contractile organs which must cease when they are relaxed. The expiration which

follows is passive, and assisted by very few muscles, and depends chiefly on the reaction of the elastic parts entering into the structure of the parietes of the chest. We have seen that the cartilages of the ribs are pretty considerably twisted, so as to carry outwards and downwards their upper edge; when the cause which occasions this twisting ceases to act, these parts return to their natural condition, and bring back the sternum towards the vertebral column, towards which the ribs descend from their weight. The diaphragm is forced towards the chest by the abdominal viscera, which are compressed by the broad muscles of the abdomen.

In every effort of expiration, as in cough and vomiting, these muscles react, not merely by their own elasticity, but they besides contract and tend to approach towards the vertical column, by pressing upwards the abdominal viscera towards the chest. The triangularis sterni, the subcostales, and the serratus inferior posticus, may be likewise ranked among the agents of expiration; but they appear to be seldom employed, and to be too slender and weak to contribute much to the contraction of the chest.

When the chest enlarges, the lungs dilate and follow its parietes, as these recede from each other. These two viscera, soft, spongy, and of less specific gravity than water, covered by the pleura which is reflected over them, are always in contact with the portion of that membrane which lines the cavity of the thorax; no air is interposed between their surfaces (which are habitually moistened by a serous fluid exuding from the pleura), and that membrane, as may be seen by opening under water the body of a living animal, when no air will be seen to escape. As the lungs dilate their vessels expand, and the blood circulates through them more freely; the air contained in the innumerable cells of their tissue becomes rarified in proportion as the space in which it is contained is enlarged. Besides the warmth communicated to it by the surrounding parts enables it in a very imperfect manner to resist the pressure of the atmosphere rushing through the nostrils and mouth into the lungs by the opening into the larynx which is always pervious except during deglutition.

Physiologists, for the most part, consider the bronchial arteries as the nutritious vessels of the lungs. They assert that, as the blood which flows along the branches of the pulmonary artery resembles venous blood, it is unfit for the nutrition of the lungs, and that it was necessary that these organs should be supplied by arteries arising from the aorta, and containing blood analogous to that which is sent to every part of the body. But though it is admitted that this venous blood, brought from every part of the body and sent into the lungs by this principal artery, may not be fit to maintain the organ in its natural economy, this blood is fit for that use when, after being made hot, spumous, and florid, by the absorption of the atmospherical oxygen, it returns by the pulmonary veins into the left cavities of the heart.

It was long believed, on the authority of Willis, that the aërial tissue of the lungs is vesicular, and that each ramification of the bronchiæ terminated in their substance in the form of a small ampulla; but at present most anatomists adopt the opinion of Helvetius. According to Helvetius, every air vessel terminates in a small lobe, or kind of sponge, fitted for the reception of air, and formed of a number of cells communicating together. These lobes, united by cellular tissue, form larger lobes, and these together form the mass of the lungs.

The tissue that connects together the different lobes is very different from that in which the ramifications of the bronchiæ terminate: air never penetrates into it, except when the tissue of the air cells is ruptured. On such occasions, which are not of rare occurrence, on account of the excessive thinness of the laminæ of the air cells of that tissue, the lung loses its form, and becomes emphysematous. Haller estimates at about the thousandth part of an inch the thickness of the parietes of the air cells; and, as the extreme ramifications of the pulmonary vessels are distributed on these parietes, the blood is almost in immediate contact with the air. There can be no doubt that the oxygen of the atmosphere acts on the blood under such circumstances, since it alters its qualities, and communicates to it a florid red color, when enclosed in a hog's bladder, and placed under a vessel filled with oxygen gas.'

Thus far M. Richerand. He goes on to say that every time the chest dilates in an adult there enter into the lungs between thirty and forty cubic inches of atmospheric air; and he further endeavours to make good the assumption which we have found in the above extract, that oxygen is absorbed in the passage of blood through the lungs. Whether this hypothesis be capable of substantiation we shall presently enquire; but first we shall extract Dr. Carson's account of the mechanism of respiration, as given by Dr. Elliotson in his notes on Blumenbach.

'The substance of the lungs,' says Dr. C., 'is highly elastic, and constantly kept in a forced state of distension after birth by the pressure of the atmosphere. This is evident also from the lungs collapsing upon our puncturing the walls of the thorax, a circumstance arising from the atmospheric pressure on the one hand becoming counterbalanced on the other, so that their elasticity, experiencing no opposition, becomes effective. During inspiration the intercostal muscles raise and draw out the ribs, and the diaphragm descends; the enlargement of the thoracic cavity is instantly followed of necessity by the greater distension of the substance of the lungs from the diminished resistance to the atmosphere, gravitating in the bronchiæ. The diaphragm and intercostal muscles ceasing to act, the substance of the lungs exerts its elasticity with effect, recovers its former dimensions, and drives out the additional volume of air just admitted, and the passive diaphragm follows the shrinking substance of the lungs, offering from its relaxation no resistance to the atmospheric pressure on the surface of the abdomen. Thus expiration is produced. The muscular power of the diaphragm and intercostal muscles is far greater than the elastic power of the lungs, and therefore, when exerted, overcomes it, producing in-

spiration; but, ceasing to be exerted, the elastic power gains efficiency and produces expiration. To the elastic, others add the muscular power of the bronchiæ, and altogether suppose the respiratory process to be more independent upon exterior powers than has been assumed. 'In the common account of respiration,' says Dr. Elliotson, 'the elasticity and muscularity of the lungs are unnoticed, and expiration is ascribed to the elasticity of the cartilages of the ribs, and to the contraction of the abdominal muscles emptying the lungs by pressure. Now, according to Dr. Carson, in the first place the elasticity and muscularity of the lungs is itself sufficient for the purpose; in the second there is no proof of the agency of the abdominal muscles in expiration; it proceeds equally well in cases of inanition, when their contraction would rather enlarge than diminish the abdominal cavity, and in experiments when they are entirely removed from animals—a child was born without them, and had lived eighteen months at the time of the publication of its case, and was very well; and, I may add, thirdly, that although the elasticity of the cartilages of the ribs must conspire with that of the lungs, numerous cases are recorded of immobility of the ribs, by ossification of their connexions, where ossification was not materially impeded. These causes are adduced to show that the diaphragm is the chief instrument of respiration; but, as its elasticity cannot produce expiration, they show that this was accomplished entirely, or in a great measure, by the lungs themselves. Even where there is no ossification, the motion of the ribs has very little share in respiration; and Dr. Bostock considers the chief use of the intercostals to be that of giving a fixed point for the action of the diaphragm; and the operation of the abdominal muscles in expiration to be nearly passive. It is commonly known, however, that if the pleura is wounded air rushes into the chest during inspiration only, and is in some measure expelled again during expiration. Were the ascent of the diaphragm, and descent of the ribs, in expiration, the effect of solely the contraction of the lungs, of a tendency to vacuum occasioned by their shrinking, air and fluids should stream to the chest as much during expiration as inspiration, should rush to fill up the vacuum as much as the diaphragm should ascend, and the ribs descend, for that purpose: nor should air be expelled from the wounded pleura; for we may regard the thoracic cavity as bounded above by the surface of the lungs, and always, in the sound state, possessing the same dimensions; the expansion of the lungs being commensurate with the descent of the diaphragm and ascent of the ribs, and the descent of the diaphragm and ascent of the ribs commensurate with the shrinking of the lungs. The fact that air does not stream into the wounded pleura in expiration, but even streams from it, while the ribs are moveable and the abdominal muscles active, proves that the descent of the ribs, and ascent of the diaphragm, one or both, in ordinary expiration, do partly occasion by compression the diminution of the lungs, or, at least, are not its passive effect, but coincide with it by independent powers, which are the elasticity of the elevated ribs (and displaced abdominal organs?), if not the contraction of the extended abdominal muscles. Haller refers expiration to the pressure of the lungs by the elastic ribs, and the abdominal and other muscles, and to the elastic and muscular contraction of the lungs themselves, which he considers more forcible than the compression. It appears to me that he is right; but that nevertheless either the lungs alone, or the walls of the chest alone, are able, when unassisted by the other, to produce expiration. The change in the situation of the ribs is moreover trifling compared to that of the diaphragm; and respiration often succeeds very well by the diaphragm alone. Animals which are remarkable for swiftness and perseverance in the race, scarcely employ the intercostal muscles, using the diaphragm almost solely.

'The beautiful contrivance in the shape of the thorax deserves attention. By its being conical every degree of motion in the diaphragm produces a greater effect on the capacity of the chest than could occur were it of any other shape.

'The passage of the air into the cells may be distinctly heard on applying the ear to the corresponding part of the chest, and is called by Laennic the respiratory murmur. It is much louder in children, and in them the cells are far more numerous and small. Whence an equal portion of lung from an infant a few days old weighs fourteen times more than from a man of seventy.

'The elasticity and muscularity of the lungs are not sufficiently great to expel the whole of this air in expiration. Thus they remain constantly in a certain degree of distension.'

By these extracts the reader will perceive that, as in the case of the circulation, it is still in some measure a sub judice point how far the heart acts independently upon other powers towards propelling the blood; so in the case of respiration different physiologists take different views of the share which the diaphragm, the ribs, the abdominal, and the thoracic muscles have in the act; some indeed ascribing the main part of the process to an independent elasticity and muscularity of the lungs themselves, while others give the principal credit to surrounding and extraneous parts: to us it would appear that the intermediate opinion even on this head, as it is on most others, is nearest the truth; and that nature has so constructed the whole of the pulmonary apparatus as for all parts to contribute their share towards the production of the effect in ordinary cases, while in extraordinary, or where one or more of the appendages are interfered with, a greater call being then made on the organs themselves, a commensurately greater power is then summoned to act.

That respiration should be performed with facility and freedom not only is a certain degree of integrity implied on the part of the organs themselves, and their assistants, if we may so name them, but it is likewise necessary that the circumambient air should be in due appropriation to the demands of the pulmonary apparatus; although even in this last respect nature does wonders often in accommodating powers to accidental deviations. The conditions of the

air to which we allude are physical and chemical—that is, a certain measure of density or rarity, humidity or dryness, is looked for by the lungs for their free play and action; but it is still perhaps more essential for the proper performance of the respiratory process, and for the full effect of the influence of that process, that the chemical composition of the air be in due adjustment. Respecting this last circumstance we shall presently then speak more at large, but first it will be right to introduce a few words on what we have just called the physical relation of the air to the lungs, in opposition to its chemical qualities and powers.

It is well known to natural philosophers that the earth is surrounded with a subtle and transparent fluid, called air; that this circumambient fluid, if it be proper to apply the term to air, presses upon all bodies which it surrounds, enters into all open spaces of these bodies, and forces itself laterally or upon the sides of the bodies as well as upon their tops or vertically. This air is compressible to an almost unlimited extent, and spaces are occupied by it in the inverse ratio of the pressure that is made upon it. Now this pressure is varied in some measure even upon the surface of the earth, according to the different conditions of humidity or heat with which the atmosphere is at the time charged; but, when we ascend to considerable heights above the surface of the globe, the pressure is much less, a difference which is perceptible even upon the summits of mountains; and thus it is that the pulmonary vacuity, which immediately upon birth the air rushes in to occupy, is differently supplied with its quantum of air, according as the pressure and density, or opposite states, are present. It would be leading us too much into the doctrines of pathology to trace these variations, and their effects upon the respiratory and other organs; it is here sufficient to have referred to the principle of air constantly seeking a vacuum to occupy, and rushing in all directions to supply this vacuum with more or less rapidity and force, according to the pressure from above, to prove that, while both inspiration and expiration are greatly regulated by the vital powers and properties of the lungs and their appendages, much also in the phenomenon of breathing has dependence upon, and relation to, the different measures of elasticity and compressibility of the atmosphere itself. Some physiologists, indeed, as we shall immediately see, account for the main circumstance upon which vitality depends; viz. the circulation of the blood upon temporary vacua being produced; and even those who do not follow these reasoners through all their assumptions and inferences allow that much even of vital circumstance is modified by the gravity of the air and its tendency to an equilibrium.

The quantity of air that enters the lungs at each inspiration has been stated, with some variation; and this variation has doubtless more dependence upon the circumstances of the individual than upon the inaccuracy of the experimenter. Allen and Pepys have estimated that at each inspiration about 16·5 cubic inches are inhaled by a stout adult man, and that the quantity found in the lungs after death is about 100 cubic inches. 'Dr. Bostock, agreeing with Menzies and many others, believes forty cubic inches to be the average inspiration, and thinks that 161 or 170 remain in the lungs after ordinary expiration, for these organs are never emptied by expiration.' The ordinary quantity of aqueous vapor emitted by the lungs, trachea, mouth, and throat, may be about twenty ounces in twenty-four hours! The different inspirations made in a given time vary, as well as the quantity of air taken in by each inspiration. The alternations of inspiration and expiration are stated by Blumenbach to be about fourteen times in a minute; once to about five pulsations of the heart. Hales estimated the average number of inspirations at about twenty; and this perhaps is pretty nearly correct. 'By taking twenty as the medium,' says Magendie, '28,000 inspirations take place in twenty-four hours. But it is probable this number is subject to considerable variations from a variety of circumstances, such as during sleep, motion, distension of the stomach with food, the capacity of the chest, moral affections, &c.'

Besides those interruptions in the process of breathing which have place from more temporary or more permanent alterations from the condition of health in the pulmonary organisation, and those which depend upon the physical varieties of the air, there are other more irregular and transient affections of the pulmonary passages, which are usually noticed under the general account of respiratory function; we allude to the acts of coughing, sneezing, sighing, &c.; and we do not know that we can do better in this instance than extract from the instructive pages of M. Richerand. We here, as in other places, employ the translated copy, and are therefore not responsible for the occasional gallicisms that occur in our citations.

Sighing.—'When the imagination,' says Richerand, 'is strongly impressed with any object, when the vital functions are languid, the vital principle seems to forsake all the organs, to concentrate itself on those which partake most in the affections of the mind. When a lover in the midst of an agreeable reverie sighs deeply, and at intervals, a physiologist perceives in that expression of desire nothing but a long and deep inspiration, which by falling distends the lungs, enables the blood collected in the right cavities of the heart to flow readily into the left cavities of that organ. This deep inspiration, which is frequently accompanied by groans, becomes necessary, as the motions of respiration rendered progressively slower are no longer sufficient to dilate the pulmonary tissue.

Sobbing differs from sighing merely in this, that, though the expiration is long, it is interrupted, that is, divided into distinct periods.

Yawning is effected in the same manner; it is the certain sign of ennui, a disagreeable affection which, to use the expression of Brown, may be considered as debilitating or *asthenic*. The fatigued inspiratory muscles have some difficulty in dilating the chest, the contracted lungs are not easily penetrated by the blood, which stagnates in the right cavity of the heart and produces an uneasy sensation, which is put an end

to by a long and deep inspiration; the admission of a considerable quantity of air is facilitated by opening the mouth widely, by the separation of both jaws. One yawns at the approach of sleep, because the agents of inspiration, being gradually debilitated, require to be roused at intervals. One is likewise apt to yawn on waking, that the muscles of the chest may be set for respiration, which is always slower and deeper during sleep. It is for the same reason that all animals yawn on waking, that the muscles may be prepared for the contractions which the motions of respiration require. The crowing of the cock, and the flapping of his wings, seem to answer the same purpose. It is in consequence of the same necessity that the numerous tribes of birds in our groves, on the rising of the sun, warble and fill the air with harmonious sounds. A poet then fancies he hears the joyous hymns by which the feathered throngs greet the return of the god of light.

While gaping lasts the perception of sounds is less distinct, the air as it enters the mouth rushes along the eustathian tubes into the tympanum, and the membrane is acted upon in a different direction. The recollection of the relief attending the deep inspiration which constitutes gaping, the recollection of the grateful sensation which follows the oppression that was felt before, involuntarily leads us to repeat this act whenever we see any one yawning.

Sneezing consists in a violent and forcible expiration, during which the air expelled with considerable rapidity strikes against the tortuous nasal passages, and occasions a remarkable noise. The irritation of the pituitary membrane determines by sympathy this truly convulsive effort of the pectoral muscles, and particularly of the diaphragm.

Coughing bears a considerable resemblance to sneezing, and differs from it only in the shorter period of duration, and the greater frequency of the expirations; and as in sneezing the air sweeps along the surface of the pituitary membrane, and clears it of the mucus which may be lying upon it, so the air when we cough carries with it the mucus contained in the bronchiæ in the trachea, and which we spit up. The violent cough at the beginning of a pulmonary catarrh, the sneezing which attends coryza, show that the functions of the animal economy are not directed by an intelligent principle, for such as are catarrhous could not mistake in such a manner the means of putting a stop to the disease, and would not call forth actions which, instead of removing the irritation and inflammation already existing, can only aggravate them.

Laughing is but a succession of very short and very frequent expirations. In hiccup the air is forcibly inspired; enters the larynx with difficulty on account of the spasmodic constriction of the glottis; is then expelled rapidly; and, striking against the side of that aperture, occasions the particular noise attending it.

Snoring, of which Richerand does not make mention, is said to be a deep, sonorous, and as it were tremulous inspiration, from the vibration of the velum palati during deep sleep, with the mouth open.

The following note is added by the editor to the page in which the physiology of the above phenomena are thus traced.

'The author has neglected to notice the state of respiration during the more active voluntary motions. Muscular exertion, especially when considerable, is preceded by a long and deep inspiration, the glottis is closed, the diaphragm and respiratory muscles of the chest are contracted, and the reaction of the abdominal muscles causes the contents of the abdomen to be pressed upon in all directions. At the same time that the respiratory muscles are exerted, those of the face are associated in the increased action in consequence of the latter receiving some nerves from the same class (see the section on the *Nervous System*), and the jaws are forcibly pressed together. By this action of the muscles engaged in respiration, the chest is rendered capacious, and the strength is greatly increased, because the trunk of the body is thus rendered immoveable in respect to its individual parts, the muscles arise from fixed points, and consequently wield the members of the body with their full energy. Haller appears to be correct in concluding that, under a state of increased action of the muscles, the flow of blood becomes greater towards the head, and thus the nervous energy is increased and amply generated by means of this augmented flow, so as to keep up the muscular action for a longer period than would otherwise be the case. During violent exertions, also, the return of blood from the brain is in some degree impeded.

The physiological state of muscular actions, as they are related to the mechanical function of respiration, is very happily described by Shakspeare, where he makes Henry V. encourage his soldiers at the siege of Harfleur:—

> Stiffen the sinews, summon up the blood.
> * * * * *
> Now set the teeth, and stretch the nostrils wide,
> Hold hard the breath, and bend up every spirit
> To his full height.

In vomiting, also, and in the action of expelling the fæces and contents of the bladder, the thoracic and abdominal muscles of respiration are brought into action.'

But, as we have above intimated, by far the most important part of respiration consists in the change effected on the blood by the action of the inspired air.

'The blood is conveyed to the lungs,' says Dr. Good, 'of a deep purple hue, faint, and exhausted by being drained in a considerable degree of its vital power, or immature and unassimilated to the nature of the system it is about to support, in consequence of its being received first from the trunk of the lacteals. We find it returned from the lungs spirited with newness of life, perfect in its elaboration, more readily disposed to coagulate, and the dead purple hue transformed into a bright scarlet. What has the blood hereby lost?' What, might our author have added, has it gained? How has this wonderful change been accomplished?

When first the Lavoiserian principles of chemistry came to be applied to the changes which the blood experiences from exposure to the oxy-

genous portion of the air, it was assumed, as a matter almost of physical demonstration, that blood, in its passage through the lungs, absorbed part of the oxygen of the atmosphere; that, in consequence of this absorption, the venous color was changed into arterial brightness; that, from the fixidation of an aërial substance, heat was engendered or emitted from its latent condition; and that this heat proved the perennial source of animal temperature.

When on this last subject, we shall have occasion to canvas the experiments and opinions that have been instituted and broached on the subject of animal heat, and its dependence upon or connexion with the changes that take place in the lungs by the respiratory process; we are now to limit our enquiry into the nature and extent of the change itself.

We for the most part refer our readers to the article ANATOMY for information on those points which relate to structure, confining ourselves in the present paper to function alone; but it may be right just to state in this place that 'the mucous web surrounding the air-cells of the lungs is supplied with innumerable blood vessels, divisions of the pulmonary artery, and four pulmonary veins, the branches of which accompany the ramifications of the bronchiæ, and after repeated divisions at length form an immense collection of most delicate and reticulated anastomoses. This extraordinary net-work, penetrating the mucous web on every side, closely surrounds the air cells, so that the prodigious quantity of blood existing in the pulmonary vessels is separated from the contact of the air by very fine membranes only, which Hales estimated at scarcely $\frac{1}{1000}$ of an inch in thickness.'

It is the extreme tenuity of this membrane, and its vast expansion of surface, to which we are desirous at present of calling the reader's attention. It must further be recollected that the atmosphere is composed of two aëriform fluids, seventy-nine of azotic or nitrogen gas, and twenty-one of oxygen, in 100. The atmosphere is indeed never without some very small portion of carbonic acid gas; but this is in so small quantity that it has been considered rather an adventitious ingredient than an absolutely essential one.

Now at every inspiration the quantity of the nitrogen gas is somewhat diminished, and the oxygen is partly converted into carbonic acid gas, or, as it used to be called, fixed air, proofs of which we are furnished with in the expired air, making lime water turbid, and giving other evidences with which chemical experimenters are sufficiently familiar.

That expired air, then, is very different in its constituents and qualities from that which was taken into the lungs is on all hands universally agreed; but the question is whence this difference, and how effected? Does the blood actually absorb oxygen, and is this oxygen conveyed by means of the circulation through the arteries; or does the inspired oxygen go wholly to the formation of carbonic acid in the bronchial cells?

The first doubts that were thrown out on the subject of aërial oxygenous absorption by the blood in its passage through the lungs were those which resulted from the experiments of Messrs. Allen and Pepys; these gentlemen could not discover that any portion of the oxygen was absorbed in ordinary respiration, and they considered that what does disappear goes to combine with the carbon of the blood, and produce carbonic acid, the latter being equal in bulk to the oxygen that has been lost. And, subsequently to these experiments, Mr. Ellis, who has published an enquiry on the changes induced in atmospheric air by respiration, contends that there is an excretion of carbon by the pulmonary vessels; and that the inspired air, that is, the oxygenous portion of it, unites with this excreted carbon, and thus forms carbonic acid exterior to the lungs, which carbonic acid is exhaled in the expirations. Dr. Prout has been led to consider this opinion accurate, from the fact that, 'when phosphorus, dissolved in oil, is injected into the blood-vessels, vapors of phosphoric acid stream from the mouth and nostrils;' the inference from which fact is, that phosphorus is most probably excreted from the blood-vessels, and unites with the oxygenous portion of the inhaled atmosphere so as to form phosphoric acid. 'If,' says Dr. Prout, 'the phosphoric acid which is inhaled under these circumstances had been formed in the vessels themselves, it would have remained in the blood, and not have been exhaled, as it is not volatile.'

Mr. Ellis advocates his principle of the non-absorption of oxygen by the blood, and of the carbonic acid exhalation being formed in the way just adverted to, by adverting to the circumstance of seeds while germinating, and even plants themselves during growth, throwing out carbon in the form of aqueous vapor, even where no oxygen is present, this ejected carbon being a secreted matter; and it is in this way he supposes that a secretion is continually taking place on the surface of the lungs and of the skin.

'According to Mr. Ellis, we have no proof of the existence of carbonic acid, or of any aëriform fluid existing naturally in the blood, and consequently have no reason to expect that any can be thrown out; while, if oxygen enter from the air-cells into the system, it must be by absorption, or chemical affinity. If by absorption, it would in animals take the regular course of the thoracic duct, and the blood in the right ventricle of the heart would first exhibit a scarlet hue; while, in the germination of vegetables, their seeds give no evidence of possessing a structure fitted to absorb and expel uniform fluids; nor of any such fluids at any time existing in them. To the operation of chemical affinity he conceives an actual contact between the air and the blood to be requisite; but in the lungs we have an intervention of the coats of the cells and of the blood-vessels. And if these be presumed to be so thin, that when moist they will allow the air or its oxygen gas to pervade them, the gas would rather pass into the interstices of the cellular membrane than into the pulmonary vessels, and thus create an emphysema. But the whole of such permeation he holds to be gratuitous and contrary to experiments. The diminution of the bulk of respired air, he thinks, may be accounted for by a union of the carbone of the blood with

the oxygen in the air cells, and the formation of aqueous vapor by the disengagement of the caloric from the oxygen of the atmospheric air.

In respect to the objection proposed by Mr. Ellis on the score of its being difficult to conceive that oxygen should permeate the membrane lining the bronchial cells, experiment has shown its fallacy and want of foundation; for it has been proved that venous blood acquires a florid color by exposure to oxygen, even when covered with a bladder, provided this bladder be moistened; and Dr. Edwards has shown that more oxygen is continually lost in the respiration of brutes than goes to the formation of carbonic acid: it has been moreover observed above that the intervening membrane between the oxygen of the atmosphere and the blood circulating through the lungs is exceedingly thin. In this particular then, as in the case of the circulation and the mechanical or physical circumstances of respiration, we feel disposed to consider that there is both truth and error in those physiologists who attribute all the effect to one source; and we should be highly gratified, did our limits permit, in presenting to our readers the view taken on this controverted subject of aërial absorption by the pulmonary blood-vessels by the able editor of Richerand's Physiology, to which, however, we refer the reader.

In respect to the change of color in the blood, from the venous to the arterial hue, we think that the fact is rather in favor than otherwise of aërial absorption; for although, as it has been properly remarked, a separation of carbon accompanies the conversion of color from the purple to the scarlet dye, yet arterial blood if enclosed in vacuo becomes purple; a proof that the mere constituents of the blood acting upon each other is a sufficient cause of the change: and Dr. Elliotson very properly adds, 'that the circumstance of venous blood remaining dark, though by the air-pump carbonic acid is evolved from it, looks rather as if the florid color were dependent upon the operation of oxygen.' Whether caloric gets admission into the blood vessels through the medium of the pulmonary circulation will be more appropriately enquired into when we are on the topic of animal temperature.

Thus have we gone to the extent of our limits in treating of the physical and chemical circumstances and changes connected with the respiratory process. It may be added that Dr. Prout has lately thrown out a suggestion that the chemical part of the function does not end in the changes effected upon the fluids in the way above traced and commented on, but that the idea of galvanic influence put into excitation by the oxidising of carbon may, if pursued, open a fruitful field of philosophising on animal functions. And every thing, we are sure, will be done by Dr. Prout that high ingenuity, active industry, and a philosophical mind can effect.

We are tempted before we go upon the subject of other purposes effected by the respiratory organisation and its appendages, viz. that of regulating the voice and speech, to present our readers with the following interesting note from Dr. Elliotson, on the length of time to which respiration may be suspended with impunity, &c. If our readers should say we do nothing but extract from others, we are very ready to plead guilty to the charge; but then it must be recollected that our professed business is merely that of collecting and collating facts and opinions: and, when we find that we cannot state these facts and announce these opinions in better language than that of the authors to whom we apply for our readers' information, it is surely better to employ their phraseology than to translate it into words of our own.

'When the air is not changed, death in general occurs long before all the oxygen is consumed through the carbonic acid which is formed, but bees, some worms, and mollusca completely deoxidise it.

Lavoisier removed the carbonic acid by potassa as quickly as it was produced, and found that a guinea pig could live in air containing but 6·66 per cent. of oxygen, and with still less become only drowsy. Dr. Edwards advances, contrary to Morozzo, that every warm-blooded animal perishes instantly when placed in air in which another has died through want of renovation, and that all of the same class among them deoxidise it equally; though in different times. This time will occasionally differ one-third, notwithstanding the size of the body and the movements of the chest be equal in them, and the carbonic acid be removed as quickly as formed. The young deoxidise it more slowly than adults; and the young if quite deprived of air die later than adults. Indeed Buffon found, and Dr. Le Gallois and Dr. Edwards have confirmed his discovery, that new-born animals of many species, as dogs and rabbits, will live a long time without air, even after they have been allowed to respire. This period lessens as the animal's temperature rises with age; and in those whose temperature at birth is high, as guinea-pigs, it is very short. They live longer than adults also in a limited quantity of air. Amphibious animals likewise live long without air.

Persons have been said to be able, by habit, to live without air a considerable time. Death generally occurs at the latest in one or two minutes when respiration is suspended; but by habit some few divers of the swimming school at Paris can remain under water three minutes. If the system is in an extraordinary state of nervous insensibility, the absence of air, like the absence of food, or the administration of strong agents, may be borne for a very long time. Even fainting renders submersion less dangerous.

Dr. E. adds, in a note on this paper, 'Some very grand instances of exaggeration on this subject will be found in an amusing and useful book entitled The Uncertainty of the Signs of Death. M. D'Egly, member of the Royal Society of Inscriptions, declares that he was engaged to a dinner for which the fish was to be provided by a Swiss diver, who obtained his living by plunging into the water and pulling the fish out of their holes. The dinner hour arrived, but no fish. Drags were employed, and the diver's body was found. The curate wished to bury it immediately, as it had been nine hours under water; but M. D'Egly determined on attempting resuscitation, and succeeded in three-quarters of

an hour. The Rev. Dr. Derham, in his Physico-Theology, is more credulous than the curé; he quotes Pechlin for the case of a man pensioned by the queen for having joined this world again, after remaining upright under water, his feet sticking in the muddy bottom, for sixteen hours, at Tronningholm. Yet this is nothing; for Mr. Tibsius, the keeper of the royal library, has written an account of a woman whom he saw alive and well after being three days under water. And this is nothing; for Mr. Burmann declares he heard a funeral sermon at Bonn, in Lithuria, upon an old man of seventy, who, the preacher protested, had fallen into the water when sixteen years old, and remained under it for seven weeks. Mr. Brydone was told that one diver called Calas, but nicknamed Pesce, could live several days in the sea; and Kircher asserts that this aquatic person could walk from Sicily to Italy.'

VOICE AND SPEECH.

One particular constituting man's preeminence over the brute creation is that of his abiliity to articulate sounds, so as to convey his sentiments and ideas; for even in that tribe of animals which most nearly resemble the human in external configuration, nothing of actual articulation has ever been accomplished; and even among those animals which are taught to imitate the articulate sounds of man, the task is merely that of imitation, and does not amount to any thing approaching even to the manifestatation of intelligence. It is true that animals have a language of their own; they make one noise, as a modern author expresses it, to express joy, another terror, another to summon their young, &c., and comprehend the meaning of sounds made by us, not only of an inarticulate kind, but also articulated. In the instance of dogs Dr. Gall relates, in his work on the functions of the brain, that 'they learn to understand not merely separate words or articulate sounds, but whole sentences, expressing many ideas. I have often spoken,' he says, 'intentionally of objects which might interest my dog, taking care not to mention his name or make any intonation or gesture which might awaken his attention. He, however, showed no less pleasure or sorrow, as it might be; and indeed manifested by his behaviour that he had perfectly understood the conversation which concerned him. I had taken a bitch from Vienna to Paris; in a very short time she comprehended French as well as German, of which I satisfied myself by repeating before her whole sentences in both languages.'

Many of our readers will think these statements are stretched out into phrenological length, and that some of the dog's understanding was only understood by his master: but whether that was the case or not, certain it is that nothing like speech was ever effected by animals of the canine class, however intelligent or however instructed; and, in fact, the structure of the vocal organs is such as to preclude the power of articulate expression even supposing the presence of a mind to compass the task: but let us, after our accustomed manner, extract from one or two modern authors on the interesting subject now to be canvassed; and, first, we will bring into requisition a writer whom we always quote with extreme pleasure, on account not merely of the interest of his matter, but the elegance and grace of his language.

'The organ of the voice,' says Dr. Mason Good, 'is the larynx, its muscles, and other appendages; and the voice itself is the sound of the air propelled through and striking against the sides of the glottis, or aperture into the mouth. The shrillness or roughness of the voice depends on the internal diameter of the glottis, its elasticity, mobility, and lubricity, and the force with which the air is protruded. Speech is the modification of the voice into distinct articulations in the cavity of the glottis itself, or in that of the mouth or of the nostrils.'

There is a difficulty, however, in determining by what means the air is rendered sonorous in the glottis, and various explanations have been offered upon the subject. The oldest is that of Galen, who supposed the calibre of the glottis to be alternately expanded and contracted, an idea revived in modern times by Dodart, who at the same time compares its action to that of a flute.

A second explanation is that of M. Ferrien, who supposes the variation of sound to depend upon variations of tension and relaxation in the ligaments of the glottis, and in this view such ligaments become vibrating chords, and the entire apparatus approaches the nature of a violin. A third explanation is that of M. Richerand, who unites the two preceding conjectures, and supposes that the glottis is a wind and a chord instrument at the same time. To these explanations we may add that of Kratzenstein, who regards the glottis, in conjunction with the whole length of the larynx, as a kind of drum; and that of M. Blumenbach, who views the former in the light of an Æolian harp: all of which are ingenious sports of the imagination, but contribute little to the advance of physiological science.

Those animals only that possess lungs possess a larynx; and hence none but the first three classes in the Linnæan system, consisting of mammalia, birds, and amphibia. Even among these, however, some genera or species are entirely dumb, as the myrmecophaga or ant-eater; the manis or pangolin, and the cetaceous tribes; the tortoise, lizards, and serpents; while others lose their voice in particular regions; as the dog is said to do in some parts of America, and quails and frogs in various districts of Siberia.

It is from the greater or less degree of perfection with which the larynx is formed, in the classes of animals that possess it, that the voice is rendered more or less perfect; and it is by an introduction of superadded membranes or muscles into its general structure, or a variation in the shape, position, or elasticity of those that are most common to it, that quadrupeds and other animals are capable of making those peculiar sounds by which their different kinds are respectively characterised; and are able to neigh, bray, bark, or roar; to purr, as the cat and tiger kind; to bleat, as the sheep; or to croak as the frog; which last, however, has a sac or bag of a singular character in the throat, or cheek, directly communicating with the larynx, on which their croaking principally depends.

The larynx of the bird class is of a very peculiar kind, and admirably adapted to that sweet and varied music with which we are so often delighted in the woodlands. In reality the whole extent of the trachea in birds may be regarded as one vocal apparatus; for the larynx is divided into two sections, or may rather, perhaps, be considered as two distinct organs; the more complicated, or that in which the parts are more numerous and elaborate, being placed at the bottom of the trachea, where it diverges into two branches or bronchiæ, one for each of the lungs; and the simplex, or that in which the parts are fewer, and consists of those not included in the former, occupying its usual situation at the upper end of the trachea, which, however, is still without an epiglottis; both food and water being, as we have already observed, rendered incapable of penetrating the aperture of the glottis by another contrivance. The lungs, trachea, and larynx of birds, may therefore be regarded as forming a complete natural bag-pipe, in which the lungs constitute the pouch and supply the wind; the trachea itself the pipe; the inferior glottis the reed or mouth-pipe, which protrude the simple sounds; and the superior glottis the finger-holes, which modify the simple sound into an infinite variety of distinct tones, and at the same time give them utterance.

Here, however, as among quadrupeds, we meet with a considerable diversity in the structure of the vocal apparatus, and especially in the length and diameter of the tube or trachea, not only in the different species, but often in the different sexes of the same species, more particularly among aquatic birds. Thus the trachea is straight in the tame or dumb swan (anas olor) of both sexes; whilst in the male musical swan (anas cygnus), but not in the female, it winds into large convolutions, contained in the hollow of the sternum; in the spoonbill (platalea leucorodia), as also in the motmot pheasant (phasianus mot-mot), and some other similar windings in the trachea occur, not enclosed in the sternum. The males of the duck and merganser (anas and mergus) have at their inferior larynx a bony addition to the cavity, which contributes to strengthen their voice.

Among singing birds Mr. Hunter, who, at the request of Mr. Pennant, dissected the larynx of many distinct kinds, observes that the loudest songsters have the strongest muscles, and that the sky-lark has the strongest of the whole, whose clear and vigorous note is often heard when he can no longer be followed in his ascent by the most penetrating eye. He observes, also, that among this division of birds the muscles of the male following the same rule are stronger than those of its respective female, whose voice is always less powerful. In birds that have no natural voice he perceived no difference of muscular power in the larynx of either sex.

From this more extensive and complicated machinery, in the vocal organs of birds, we find numerous species possessing powers of a very extraordinary kind. In many of them, as the thrush and the nightingale, the natural song is exquisitely varied, and through an astonishing length of scale. In the pipra musica, or tuneful manakin, the song is not only intrinsically sweet but forms a complete octave, one note succeeding another, in ascending and measured intervals, through the whole range of its diapason. There are various kinds that are capable of imitating the music of human art, and amuse us by acquiring national and popular tunes; as the bullfinch, the linnet, and even the robin, when reared in a state of separation from all other birds; whilst some again are capable of imitating human speech, as the parrot, the jay, and jackdaw, and indeed most of the psittacus and corvus genera; a fact which proves the possession of a powerful and retentive memory, as well as of a precise and delicate ear. A linnet, acording to Mr. Pennant, was once taught the same at Kensington; and even the nightingale is said to have talents for speaking equal to those for singing. But where is the man, whose bosom burns with a single spark of the love of nature, who could for a moment consent that this sweet songster of the groves should barter away the touching wildness of its native notes for any thing that art has to bestow?

Yet, perhaps, there is no species among the class of birds that is more entitled to notice in a physiological survey, on account of its voice, than the turdus polyglottus, or mocking bird. This is a subdivision of the thrush kind; its own natural note is delightfully musical and solemn; but beyond this it possesses an instinctive talent for imitating the note of every other kind of singing bird, and even the voice of every bird of prey, so exactly as to deceive the very kinds it mocks. It is, moreover, playful enough to find amusement in the deception, and takes a pleasure in decoying smaller birds near it, by mimicking their notes, when it frightens them almost to death, or drives them away with full speed, by pouring upon them the screams of such birds of prey as they most dread.

Now it is clear that the imitative, like the natural voice, has its seat in the cartilage and other moveable powers that form the larynx; for the great body of the trachea only gives measure to the sound, and renders it more or less copious in proportion to its volume. It is not, therefore, to be wondered at that a similar sort of imitative power should be sometimes cultivated with success in the human larynx; and that we should occasionally meet with persons who, from long and dexterous practice, are able to copy the not s of almost all the singing birds of the woods, or the sounds of other animals; and even to personate the different voices of orators, and other public speakers.

One of the most extraordinary instances of this last kind consists in the art of what is called *ventriloquism*, of which no very plausible explanation has yet been offered to the world. On this obscure subject we might present some very interesting matter from the author to whom we have been principally indebted for the preceding account of the vocal organisation and function; but our limits preclude our going further into the question, and we must refer to the articles bearing on the subject, in the body of the work, for more ample disquisition.

We have only room to add a few words on

the rationale of articulation as opposed to the mere exertion of the voice. We of course presume the necessity of more than brutal intelligence to compass articulation, but it is the quo modo of the thing itself which demands a little further enquiry in this place.

Speech has been defined a peculiar modification of the voice adjusted to the formation of the sounds of letters by the expiration of air through the mouth or nostrils, and in a great measure by the assistance of the tongue applied and struck against the neighbouring parts, the palate and front teeth in particular, and by the diversified action of the lips. Thus is it constituted by modifications which the voice is made to pass through from the motions of these assisting parts of the articulating organisation. 'The ape, in which these parts are formed as in man would speak like him, if the air in passing out of the larynx did not rush into the hyothyroid sacs, in some animals membraneous, but cartilaginous in others, and even osseous in the alouate or purr, whose howl is so hoarse and frightful. Every time the animal wishes to cry, these sacs become distended, and then emptied, so that it cannot furnish the different parts of the mouth with sounds to be articulated.'

The classification of these articulations into vowels and consonants has been generally recognised; in point of fact, however, articulated sounds are constituted by vowels, the consonants being merely for the purpose of connecting vowels together. The utterance of consonants is necessarily more forced and unnatural than that of vowels, the latter being formed by the voice, modified but not interrupted by the varied position to which we have alluded of the tongue and lips; and hence the superior harmony of those languages which have the greatest number of such letters, as in the ancient language of the Greeks, quibus dedit ore rotundo musa loqui. Hence, on the other hand, the harshness of some of the northern languages. 'It would be difficult,' says Richerand, 'to accumulate a greater number of consonants in one word (and consequently a word of more difficult pronunciation till the organs of the voice come to be used to the practice) than is found in the proper name of a German called Schmidtgen. It should be observed, however, that after the difficulties shall have been conquered of this kind of pronunciation, or when the organs may have been used to it from infancy, a much more harmonious result is effected than would à priori be conceived.

On Living Temperature, or Animal Heat.

All animals as far as can be ascertained, and even vegetables, have a tendency to preserve a temperature more or less distinct from that of the surrounding medium. Yet the difference among them in this respect is so great that they have been divided into warm and cold blooded. To the former belong the more complicated, those whose pulmonary apparatus is most elaborate; man and mammiferous quadrupeds and birds. To the second oviparous and quadrupeds, fish, and most of the intervertebrate. Birds have the highest temperature 107° to 110°, man 96° to 98½°. There is some variation, not only in individuals, but according to age, season, and climate. It is less in the young according to Dr. Edwards and Despretz; the former states the human temperature in infancy to be 94½°; the latter asserts that, while in birds it is 105° in winter, it is nearly 111° in summer, gradually increasing in spring and diminishing in autumn. In the heat to which Dr. Fordyce and his friends were exposed, the temperature of the body rose two or three degrees; and Dr. Delarade, in a vapor bath at near 120°, found the heat under his tongue increased but about five degrees at the end of seventeen minutes. In sparrows and yellow hammers Dr. Edwards found it five or six degrees higher in summer than in winter; and Dr. Davy one or two degrees higher in Ceylon than in England. In disease it will fall, and on the other hand rise; in fever it has been noted at 107°, in tetanus at 110°, and probably on tonic occasions it rises still higher, at least locally. In old age it is not so high as in the age of full vigor, nor in remote parts as in those nearer the heart. John Hunter made observations on the heat of cold blooded animals. The thermometer in the stomach and under the skin of the abdomen of the frog and toad stood at 40° when the atmosphere was 36°; in the lungs of snails at 35°, 36°, 37°, 38°, when the atmosphere was at 28°, 30°, and 34°; the heat of earth worms was 58½, when the atmosphere was 56°. Fish are not above two degrees warmer than the water. Cold blooded animals placed in an elevated temperature are much more influenced by surrounding media than the warm blooded. Yet frogs are but 80° or 82° in a medium of 110° or 115°. The heat of insects when congregated is considerable. J. Hunter found the thermometer rise to 93° or 98° in a hiv in spring, to 104° in summer, to be at 82° when the air was 40°, and at 73° in winter.

The same tendency in vegetables is shown by the greater difficulty with which the juices in their stems and branches are frozen than lifeless fluids, by ice thawing when roots shoot into it, and by snow upon the leaves or stems of plants thawing sooner than that which lies on surrounding inanimate bodies. J. Hunter observed a branch of growing fir and a bean leaf thaw the part of the surface of a freezing mixture, on which it was placed, and the fir subsequently another to which it was removed. When the sheath of the arum maculatum and cordifolium is bursting, and the cylindrical body just peeping forth, it is said by Sennælicer to be so hot for some hours as to seem burning, and twelve of them placed round the bulb of a thermometer to have raised the mercury from 79° to 143°.

Even eggs are cooled and frozen with more difficulty than equal masses of inanimate matter; although when once frozen, and their life destroyed, they freeze readily.

We are naturally led to investigate the cause of this peculiarity in an organised body; and it is not surprising that, when the chemical changes that occur in the blood while circulating through the lungs came to be applied to the explication of vital phenomena, these changes were applied also to the exposition of the perennial and independent temperature of animals.

The explanation, says a modern physiologist, of this equable and perpetual temperature is particularly simple and natural, and founded on the doctrine which makes the lungs the grand focus, and the decomposition of the oxygenised portion of the air which we breathe the fomes of our heat. For as the oxygenous part of the inspired air is decomposed in the air cells of the lungs, in such way that its base, viz. oxygen, which by its union with latent caloric was before aëriform, now separates from this caloric; it would appear that by this decomposition one portion of the caloric is rendered sensible in the bronchiæ, and the other enters in a latent form into the blood while circulating in the innumerable and delicate networks of the pulmonary vessels. This theory of course goes upon the presumption that the capacity of carbonic acid for heat being less than the capacity of oxygen, when the blood is deprived of carbonic acid by respiration, its capacity for heat becomes greater; and the simplicity and beauty of the doctrine gained it almost universal admission. Upon further enquiry and reflection, however, it was conceived that several circumstances in the living frame stood adverse to its adoption; it was said that even allowing the previous absorption of oxygen by the pulmonary vessels, the gradual and equable supply of heat to the frame could scarcely be explained upon these principles; and the alterations in interior heat without corresponding, or at least proportionate changes in the lungs, as in cases of febrile, nervous, and other states, were adduced as difficulties and impediments to the reception and application of Dr. Crawford's principles. Heat of a part too, it is known, may be increased by exercise of that part, or other circumstances which do not imply the necessity of any pulmonary change; and altogether it came to be generally understood and felt, that while much ingenuity and a certain degree or measure of truth were to be found in the hypothesis of Crawford, a good deal remained both of a positive and negative nature to invalidate the legitimacy of its inferences.

At length came Mr. Brodie's experiments, which, at their first announcement, were supposed to have thoroughly overturned the hypothetical doctrine of Crawford and others, and to have proved that the perennial temperature of animals is rather referrible to a certain condition of the brain and nerves than to the decomposition of air in the lungs. Mr. Brodie decapitated an animal, and found that he could for some time keep up the respiratory act by artificial means, and that he could thereby change the blood from venous to arterial by abstracting the carbone as completely as in the case of natural breathing; were this change then the cause of animal heat, it was natural to suppose that while the action of the heart could be preserved the temperature of the animal experimented on would be preserved also; but, instead of this, the body cooled and became of a lower and lower temperature, till the action of the heart ceased altogether. The inference, then, of Mr. Brodie, and in this inference he has been countenanced by the opinions of others, was, that the chemical theory of animal temperature is untenable.

But this inference has by others again been maintained to be fallacious, since artificial respiration never can so nearly imitate natural breathing as to be productive, throughout the frame, of the same results. In artificial respiration, it is urged, the air does not rush into the pulmonary cells, because these are in a vacuum, but is propelled into, and forcibly, and therefore injuriously, dilates them; the consequence is the formation of a large quantity of frothy mucus. 'Whether,' says the author from whom we now extract, 'the fall of temperature be owing to the evaporation of this copious secretion and its prevention of contact between the air and air-cells, or to the injurious nature of artificial respiration, still the fact ascertained by Le Gallois, viz. that, under artificial respiration, the animal may be killed even if no part be injured, destroys the conclusions which appeared deducible from Mr. Brodie's experiments. Indeed, he adds, Le Gallois found that less oxygen was consumed than in natural breathing, and that the temperature fell exactly in proportion to the smallness of the quantity of oxygen consumed; which, by the way, is contrary to the statements of Mr. Brodie. But on this controverted point we shall make room for the opinions of two able authors, Dr. Elliotson and Dr. Copland, who take somewhat different views of the subject; merely premising that a mixture of truth and error may have crept into both assumptions, and that much more both in the way of experiment and observation than we have hitherto had is requisite to satisfy the mind of the impartial enquirer.

'A host of circumstances,' says Dr. Elliotson, 'show that our temperature depends upon respiration, and, therefore, upon chemical changes.

'In high temperatures we have less necessity for the evolution of heat; in low temperatures more. Accordingly, in the former, the arterial blood remaining arterial is nearly as florid in the veins as in the arteries, and the inspired air is less vitiated; in low temperatures the venous blood is extremely dark, and the inspired air more vitiated. Some have imagined that the body remains at its standard high temperature by the refrigeration of the evaporating sweat. But, though this must contribute, it is not the sole cause; for frogs lose as much proportionably to their size by evaporation as any other animal, and yet they follow pretty closely the surrounding temperature. Whenever, on the other hand, the body itself heightens its temperature, as in fever, more oxygen is consumed by the lungs. The temperature of the various classes of animals, and their vitiation of the air, are always proportional; and inverse to the length of time they can live without air.

'The temperature of young animals is lower than that of adults, or rather they maintain a peculiar temperature much less; and they vitiate the air less; and require respiration less proportionally than adults. As they proceed to vitiate it more, and require respiration more, their calorific power increases. While their calorific powers are weak, they breathe, if they are exposed to cold, quicker, so as to keep up their temperature as much as possible. The same is also found in adult warm-blooded ani-

mals, not of the hybernating family, when exposed to cold.

'Dr. Edwards found that habit has great influence on the calorific powers of animals; that a given low artificial temperature in winter will reduce the animal heat much less than in summer, and that with the habit of evolving more heat in winter is acquired the habit of consuming and requiring more oxygen, so that animals supplied with a given quantity of air, and placed in a given warm temperature in winter, die much sooner than in summer. Yet the momentary application of heat or cold has a different effect; the former heating less if the body has been subjected to a low, and the latter cooling less if the body has been subjected to a high temperature. We all feel the cold less quickly on leaving the house in winter if well warmed first, than if we leave it already chilly.

'When animals hybernate, their temperature falls and their respiration is nearly or entirely suspended. Their consumption of air lessens as the temperature falls, whence they consume less in November than in August. If hybernating animals, while torpid and still placed in the same temperature, are stimulated mechanically to breathe, their temperature rises with the progress of respiration.

'If the cold, to which they are exposed, be so intense that it threatens death, it actually no longer depresses respiration, but for a time excites it, and their temperature rises proportionally. Man, and other non-hybernating animals, breathe more quickly when exposed to cold, no doubt, for the purpose of supplying heat, till the powers become exhausted.

'The higher the temperature of the animal the more extensive is the aggregate surface of the air cells, the more blood passes through its lungs, and the more necessary to its existence is respiration. The lungs of cold-blooded animals are not subdivided into minute cells, but formed into vesicles; and birds which have the highest temperature among animals are drowned the soonest.

'The changes of air by the blood are seen to be effected entirely by the red particles. Provost and Dumas found that the number of red particles is proportionate to the temperature.

'If the blood circulates without being first properly changed in the lungs, the temperature is below the natural standard. Those who have the blue disease are cold; and coldness is a symptom of hydrothorax, and of the repletion of the air cells with mucus in chronic bronchitis; in the former of which affections the lungs cannot fully expand, and in the latter the air is prevented from coming fully in contact with the air cells.

'In cold climates, and in temperate ones, in cold weather, animal food is desired and taken in abundance; in hot climates, and during the summer in temperate regions, light vegetable food is preferred, and the appetite less. We may conceive the former diet more calculated to support a process similar to combustion, and under the former circumstances we have seen that the changes of the air in the lungs are actually more considerable.

'The temperature of parts falls, if not maintained by a constant stream of blood from the lungs through the aorta and its ramifications, and is ceteris paribus, in exact proportion to this supply.

'Whether Crawford's theory be correct or not, the production of animal heat must be as evidently a chemical process as changes of animal temperature among inanimate bodies; yet some ascribe it to nervous energy. I cannot imagine nervous energy to cause heat any more than to cause chemical affinity: as it may bring substances together which have an affinity for each other, and thus produce their union, so it may effect those changes which are, according to physical laws, accompanied by changes of temperature; but caloric in the body must, I apprehend, like affinity, follow the same laws, and no others, as out of the body. This, however, does not prevent animal temperature from deserving the epithet vital, because it is regulated by the vital powers of the system, although through the instrumentality of chemical changes. If the high temperature of an inflamed part is owing to increased momentum, the increased sum of the quantity and velocity of its blood; yet this increased momentum is produced by vital powers.'

Here our author introduces remarks on Mr. Brodie's experiments, which, having already been referred to, need not be repeated. He then goes on to say, 'Dr. Philip has made experiments equally conclusive with those of Dr. Le Gallois against the inferences drawn by Mr. Brodie. As very little air is taken into the lungs in natural inspiration, and a regard to the bulk and frequency of each inspiration not always attended to in experiments, it is very probable that that gentleman had thrown too much air into the lungs, so that the unnatural quantity of cold air, and the augmented secretion of bronchial fluid, made the temperature fall. By impelling little, and that not frequently, Dr. Philip found that artificial respiration, after the destruction of the brain, actually retarded the cooling of the animal, while stronger respiration did actually cool the body.

'Of two rabbits killed in this way, their temperature being 104°, one was subjected to six artificial respirations, and the other to from twenty to thirty in a minute; the temperature of the former was 100° at the end of an hour, and that of the latter 98°. Of two with the temperature at 102·5° one was undisturbed, and one subjected to about thirty inspirations in a minute; the temperature of the former at the end of half an hour was 98·75°; of the latter only 98·5°. But the lungs of the latter being now inflated but about twelve times in the minute, the temperature of the former at the end of another half hour was 95·25°, and of the latter 96°. In one experiment, in which the lungs were inflated but a few times in a minute, the temperature actually rose nearly a degree by artificial respiration. Dr. Hastings at the same time made similar comparative experiments, and with similar results. In one the rabbit in which artificial breathing was performed cooled only 4°; while that which was left undisturbed cooled 7·5°.

'Dr. Philip afterwards took pairs of rabbits, killed them in the same way, and then in one experiment destroyed the brain and spinal marrow of one with a wire, while he left the other

untouched; in another, precisely similar, he inflated the lungs of both. Yet in each experiment they both cooled equally. In a third the brain and spinal marrow of one only was destroyed, and the lungs of both inflated. These two cooled equally.

'The temperature of fœtuses born without brain is maintained during the few days that they may live.

'Professor Rudolphi remarks that the temperature of animals bears no proportion to their nervous system; that if it did, man should be warmer than any brute; the mammalia much more so than birds; fish much more so than insects; and birds and amphibia nearly upon a par,—all which would be the reverse of the fact.

'Vegetables have a tendency to preserve a peculiar temperature, and they have no nervous system.

'But that the nervous system affects the temperature is certain; a passion of the mind will make the stomach or the feet cold, or the whole body hot. Paralysed parts are often colder than others, or more properly are more influenced than others by all external changes of temperature. But every function is affected by the mind, though not dependent on the brain for its regular performance. And in varieties of temperature, both by the state of the mind and by paralysis, there is as far as we can judge a commensurate affection of the local circulation. Parts heated by any passion are also red, and vice versâ; and paralytic parts must have imperfect vascular functions in some measure at least from the want of the compression of the vessels by muscular action, and of the general excitement by volition; they waste and sometimes inflame or ulcerate, or slough on the slightest injury. And parts perfectly paralysed still maintain a temperature above that of the surrounding medium as well as circulation, secretion, &c., and sometimes the same as in health.

'Dr. Philip considers galvanism an important agent in the nervous system, and found that it raised the heat of fresh arterial blood 3° or 4°, and at the same time made the blood venous; a circumstance proving that the action is purely chemical—an alteration of the blood to that state in which its capacity for caloric is less.

'There is certainly no more reason to believe animal heat dependent on the nervous system than secretion, and every organic function. That like these it is influenced by the state of the nervous system is certain, but never I imagine except through the instrumentality of chemical changes.'

'We shall now contrast with these very important statements and very ingenious remarks the quotation from Dr. Copland, to which we have already alluded as containing much of interesting matter.

'The ganglionic system of nerves,' says Dr. C., 'by means of the influence derived from its principal and subordinate sources and numerous distributions, and exerted upon the vascular system, generates animal heat throughout the body, and the production of animal heat takes place in a manner analogous to the processes of nutrition and secretion. The experiments of insulating a limb, by dividing all the voluntary nerves and arteries, excepting one arterial trunk, performed by Mr. Brodie in order to ascertain the effects produced upon the generation of heat in the limb, prove this proposition, and could not fail of giving rise to what was actually observed. For the ganglial or vital nerves supplying that vessel could not be completely detached as long as any of the coats of the artery remained undivided.

'The state the nof animal heat, like other secretions, will be greatly modified by the condition, both as it respects kind and degree, of the vital influence of the ganglial system, and by the state of the blood on which this influence is exerted, which state will have a double operation in modifying the result.'

In another part the author, from whom we are now extracting, goes on to say:—

'Animal heat, however intimately related with the respiratory process, cannot be considered a function of the lungs. It must nevertheless be allowed that the changes induced on the blood during respiration are preparatory to the evolution of this heat; and although we contend that the effect is immediately the result of a manifestation of the vital influence of the ganglial system of nerves, exerted upon the blood contained in the vessels to which these nerves are distributed, yet it must be admitted that the respiratory processes are requisite to its production, inasmuch as they produce on the blood a change of properties which are requisite to excite this system; and as this fluid, when thus changed, contains the materials necessary to, or is otherwise in a suitable condition for the manifestation of, the influence which that part of this system of nerves which is distributed to the blood-vessels exerts.

'Preparatory changes thus take place in the lungs, which are necessary to the exertion of this influence, and to the evolution of heat; but, as it was contended that these changes are more of a vital than a chemical nature, so it is considered that the production of heat is more the result of the influence which the nerves of the vessels exert upon the blood, than of the change in the capacity for caloric which the blood itself experiences in its passage into the venous state. The difference of capacity which actually exists between venous and arterial blood is not sufficient, according to the experiments of Dr. Davy, to form the basis of the chemical theory formerly received; but the difference which actually does exist may be concerned in a subordinate manner in the process.

'We infer that the various causes which modify the production of animal heat, act 1. Immediately upon the organic system of nerves themselves, changing the condition of their influence; 2. Upon the blood, altering the nature and composition of this fluid, and thereby rendering it unfit for producing the requisite excitement of this system of nerves, and incapable of the changes which the influence of these nerves produces upon its constituent parts; 3. Immediately through the centro-spinal system, modifying the influence which this system imparts to the ganglial.

'These different ways in which the vital influ-

ence exerted by this system of nerves in the production of animal heat is modified might have been illustrated by experiments, and by references to facts in comparative physiology, if our limits could have admitted so great an extension of them. From what we have said, it will however, be perceived, that we view the production of animal heat more in the light of a vital secretion than of a chemical phenomenon; and that, like the other secretions and nutrition, it proceeds from and is controlled by the vital influence of the ganglial system of nerves.'

Of Secretion.

Exhalation, secretion by follicles, and secretion by glands (these glands being differently constructed in different parts of the body, according to the purposes they are to serve), it will be seen, by referring to the table of arrangements, are the several items noticed by the constructor of the table.

Secretion, we may state generally, is that process by which is separated from the blood every species of animal fluids, and indeed we might say of animal solid, because, although in a state of solution, when thrown out of their respective vessels, all parts, even the most compact of the frame, are built up as it were through the medium of the secretory process.

This function, when considered in all its bearings, is one of the most astonishing which vitality unfolds; for from precisely the same fluid, the blood, are elaborated matters both widely different from each other, and as different from the material (the blood) whence they are manufactured. Thus, what can be more unlike than the urine and the fluid from which it is furnished, or than the urine itself and other secretions? and when we attempt to explain the matter upon mechanical, or even chemical principles, we still, allowing that our premises and conclusions should be correct, remain in thorough ignorance of the power which directs to these nice combinations and results.

Secretory processes have been divided into three kinds, 1. Serous transudation, which is supposed to be effected by the termination of arterial tubes of a minute kind upon surfaces which furnish the matter thus exhaled. These terminations of vessels, however, we have already said are rather supposed than demonstrated; and some have imagined exudation through the coats of capillaries, rather than matter poured out from open mouths.

The second kind of secretory apparatus has been described by follicles, cryptæ, or lacunæ, which consist of a great number of vessels, so constructed as that an excretory duct is sent out from the congeries in the form of what an anatomist would call a vas efferens. This kind of gland is described as being found in the ear, in the tonsils, and other organs which secrete a particular kind of matter; and indeed when once we admit of conglomeration, as opposed to conglobation, we admit into the division the most complicated, as well as the least complex of the glandular organisation; so that the division might stand thus, which indeed is Blumenbach's, viz. merely, 1. Transuding vessels; 2. Secretory follicles; and 3. Those supplied with an ex cre tory duct sent out from the congeries of vessels constituting the gland. The main objection to this division in our minds would be that transudation cannot be supposed without some converting power in the transuding pore, unless in cases where the exhalation should be merely the more tenuous part of the blood, and uniformly the same in every part.

On glandular structures, however, even without reference to the peculiarity of the matter they engender, there is much that is still obscure. We copy the following sentences on this head from Blumenbach:—

'Properly speaking, the conglomerate, as they are called, to distinguish them from the lymphatic conglobate, are the only two secretory organs; such as the salivary and lachrymal glands, the pancreas and the breasts. They are provided with an excretory duct coming immediately from the large lobes which are composed of others, smaller, and whose interior structure was once the source of warm disputes in the schools of medicine. Malpighi considered the miliary globules which are easily discovered in most glands as acini, according to his expression internally excavated. Ruysch on the contrary contended that these supposed hollow acini were nothing more than glomerules of blood-vessels, an opinion shown to be far more consistent with nature by microscopical observations, and the effect of minute injection.

'The structure of some secreting organs, especially of the liver and kidneys, the latter of which strikingly exhibit the glomerules of Ruysch or the acini of Malpighi, are not, excepting in their peculiar parenchyma, very dissimilar from this structure, and indeed throw considerable light upon the question. On the outer part of these, small twigs arise from the sides of the capillary arteries, and run into vascular glomerules, hanging from them like granules as from stalks; from these arterial glomerules spring both very minute, colorless, secreting vessels, and the radicles of veins into which the arteries are continued, and which convey back into the venous trunks the remaining blood deprived of the secreted fluid.'

It has been made a question how far the blood-vessels supplying glands should be considered merely organs of supply to those glands, or whether it is in these and from these vessels themselves that the glandular function is effected.

'The formation of the new substance within the vessels may be demonstrated,' says Mr. Hare, as quoted by Dr. Elliotson, 'by forcing colored injections into the arteries of growing bones, when the lime is seen to issue from their orifices in the form of a white powder, and deposit itself like the farina of a flower for the office of consolidation. In a similar way 'the injected arteries of the common domesticated hen, while her eggs are incomplete, will show the deposition of lime from their exhalant branches upon the membrane which afterwards becomes the shell.'

We have thus in some measure deviated in the present instance from our plan of excluding anatomical delineations, because in the structure

of these separating manufactories, so to name them, there is a good deal that is rather conjectural, or at least disputable, than actually demonstrated; so that the composition of these parts is in some sort their physiology.

The fluids which they separate have been divided by Fourcroy into 1. The saline, as the sweat and urine; 2. The oleaginous or inflammable, as the fat, the wax of the ears, &c.; 3. The saponaceous, as bile and milk; 4. The mucous, or those which are found on the surfaces of internal membranes, that are hence called mucous tissues; 5. The albuminous, comprising the serous part of the blood; 6. The fibrous, which resides in another portion of the blood.

Dr. Bostock's arrangement, in his recently published system of physiology, is into the aqueous, as the perspiration and halitus from the lungs; the albuminous, comprising 'all the membranous or white parts of animals, the fluids of serous membranes, and those of the cellular membrane,—the former differing from the albumen of the blood chiefly in being freed from extraneous matter and coagulated, the latter from serum, chiefly in containing much less albumen; the mucous comprising the mucus of all mucous membranes, the saliva, gastric juice, tears, and semen; the gelatinous furnishing membrane and going to the formation of skin; the fibrinous, or the muscular fibres abounding in azote, and thus more completely animalised resembling the fibrin of the blood, apparently their source; the oleaginous, comprehending the fat, marrow, and secretions of sebaceous glands, and perhaps the milk, as its properties depend so considerably on oily matter; the resinous, which are similar to the former, but owe their specific character to a kind of resin; the osmazomean, an animal principle, which in all parts of the body is referred to this division; the saline or, the acids, alkalies, and neutral and earthy salts of the various solids and fluids.

On this arrangement Dr. Elliotson very properly remarks that 'it is certainly good, but, like every other arrangement of natural objects, convenient for general views and memory rather than correct. The semen is mucous, but unlike every other fluid; the gastric juice and cerebral substance are equally sui generis. Fibrous matter as well as mucous exists in semen, and is probably indeed its specific part; albumen exists abundantly in milk united into an emulsion with the oleaginous portion. The bile and urine have few properties in common, and urea is certainly not a resinous substance.

For an account of the chemical composition of these several and separate secretions we must refer to the article CHEMISTRY, and in some places to the respective words as they occur in alphabetical order. We shall terminate the present section with a few remarks on the peculiarities of the fat, the urinary secretion, and the matter of perspiration.

Fat.—Every part of the body is connected together by cellular membrane, and into some parts of this tela is deposited an oily semi-fluid substance, which, when first formed from the blood, exists in drops; but even during life it is more diffused and less concrete in some parts than in others: after death, from the cessation of vital action and from the reduction of temperature, it assumes every where the form of a concrete substance.

'There have been controversies respecting the mode of its secretion; some, as W. Hunter, contending that it is formed by peculiar glands; others that it merely transudes from arteries. Besides other arguments in favor of the latter opinion, we may urge the morbid existence of fat in parts naturally destitute of it; a fact more explicable on the supposition of diseased action of vessels than of the preternatural formation of glands. Thus it is occasionally formed in the globe of the eye; a lump of hard fat generally fills up the place of an extirpated testicle; and steatoms have been found in almost every cavity of the body.'

One of the most remarkable circumstances connected with this secretion is the rapidity with which it is occasionally formed and dissipated; in the latter case it must be reabsorbed; this is more especially the case in some constitutions than in others. You will see individuals often manifestly fatter on one day than on the preceding or succeeding day.

Hydrogen and carbon are more abundant in fat than azote, and it has hence been supposed a kind of intermedium for a portion of the nutritive matter extracted from the food, through which it must necessarily pass before it is assimilated to the individual, of which it is destined to repair the loss. Thus, it is said, that an individual with much fat is able to abstain from food longer than another without this supply, and during such abstinence the collected fat is rapidly reabsorbed. Others have supposed that fat affords a receptacle for the superfluous hydrogen of the system, which could not otherwise be easily evacuated; certain it is that it lubricates the solids and thus facilitates motion; it serves also, by filling up the angles and interstices of the body to give a roundness and smoothness to the form; hence the characteristic beauty of the infantile period. It serves also to prevent inordinate sensibility by surrounding, and thus defending, the extremities of the nerves; and it manifestly serves as a defence against cold, partly from the circumstance that animal oil is a bad conductor of caloric, and therefore preventive of the rapid transmission of heat to a cold medium. Like all the other secretions it is greatly influenced by conditions of the mind. Much fat and much anxiety are scarcely compatible.

> 'Yond' Cassius has a *lean* and hungry look;
> He *thinks* too much.'

Urinary secretion.—The composition of this fluid, as well as that of the other secretions, will be found in the article CHEMISTRY. We shall only here offer a remark or two on the mode in which it is secreted; on the manner in which it is transmitted to the bladder; retained in it and expelled from it; on the rapidity with which some matters are conveyed from other parts of the frame into the urinary organs; and on the purposes which urine, as an excretion, is sup-

posed to answer in reference to the general economy of the animal system.

'If ever,' says Richerand, 'the art of man shall penetrate into the mystery of the intimate structure of our organs, it seems probable that the kidneys will furnish the first solution of the problem. Even coarse injections pass readily from the venal arteries into the ureters or excretory ducts of the kidneys, a convincing proof of immediate communication among the minute arteries, which, exceedingly tortuous, form with the minute veins the cortical or outward substance, and the straight urinary tubes which, distributed in conical fasciculi into the interior of these organs, constitute what has been called its tubuli and papillæ. This free communication, he goes on to say, gives an idea of the rapidity with which the blood must flow through these organs whose firm consistence allows a very moderate dilatation to the vessels.' The great difficulty, however, in this, as in other instances of secretory organs, is to find the precise point where the pabulum of secretion becomes itself actually the secreted matter; and there is nothing either in mechanism or chemistry that satisfactorily unfolds this secret. That the transmutation is gradual, in one sense, seems to be proved by the circumstance that the urine in the ureters is turbid and imperfect, and by its acquiring, as it passes along these ducts, the characteristic quality of urine. What impels it through the ureters? Partly gravity, and partly the contractility of the ureters themselves, aided, it is said, by the compression of the abdominal viscera in their alternate motions during respiration, and the concussion attending the several kinds of bodily exercise. It is questionable, however, whether these last have any power in propelling the fluid from the kidneys into the bladder. The retrograde flow of the urine, when it has once entered the bladder, is prevented by the oblique insertion of the ducts.

'The following are the causes which enable the bladder to retain the urine; the contraction of its sphincter, a muscular ring surrounding the termination of the organ into the urethra; the angle formed by the urethra after it leaves the bladder; and, lastly, the anterior fibres of the levator ani which surround the neck of that organ, surrounded beside and supported by the prostate gland.' At length the collection of the fluid in the bladder causes an uneasy sensation and urges to the discharge, which is effected both by the action of the detrusor urinæ, and abdominal pressure. In men the acceleratores are called into action, and 'Mr. Charles Bell has described two long muscles running from the back of the prostate gland to the orifice of the ureter; their action is not only to assist in emptying the bladder, but to pull down the orifice of the ureter,' so that we have another cause preventing the reflux into the ureter from the bladder, even when the last organ is repleted.

We have already alluded to the rapidity with which various substances come to affect the urinary organs, and this in truth is one of the greatest arcana in the whole animal economy. That communications between the stomach and kidneys exist by undiscovered channels has been inferred by the rapidity with which fluids disappear from the former and impregnate the latter, even when the pylorus has been tied, and thus exit prevented from this channel. It is probable that the investigations that are now being made on the subject of absorption, and its peculiarities, may tend to throw more light than hitherto has been cast on this remarkable fact: and here it may be proper to remark that the kidneys are not the only parts upon which this speedy transfer is made from one to another portion of the frame. In Dr. Cooke's recent publication on apoplexy we have an account of a man who fell down dead immediately upon taking a large quantity of gin, and of a fluid smelling like gin being found in the ventricles of the brain. In this case, if the narration be true, the transmission must have been exceedingly rapid; for it could not have taken place after death; and we have just said the fatal consequence of the liquor manifested itself almost immediately upon being swallowed.

It is not here our intention to go into pathological considerations on the venal function, and the changes of which the urine is susceptible (see Urine or Urea in the body of the work); but we have here to remark that the kidneys have been supposed the organs through which the system is freed from its superfluous azote, as the lungs and liver serve the purpose of getting rid of the refuse quantity of carbon; this inference has been drawn from the large quantity of the azotic principle which the urea of healthy urine contains. With respect to the mode in which urea is formed and separated, we may insert the following extract from Dr. Copland's note on Richerand:—'It seems not improbable that the debris of the textures, being carried into the circulation, is converted by the influence of the organs and vessels through which it flows into the substance called urea, and that the function of the kidneys is to eliminate it with other materials that would be hurtful to the system.' Dr. C. founds this opinion on the experiments of Dumas, Prevost, and Le Gallois, who found, on examining the blood of living animals whose kidneys had been extirpated, that it contained urea, the quantity of which was increased in proportion to the duration of life after the operation; whilst this substance could not be detected in the blood of those animals in which the urinary secretion was uninterrupted. It is therefore thought that urea is not formed in the kidneys by their appropriate functions, as some physiologists have conjectured; but that it, and probably other materials which are removed from the blood by these organs, are derived from other sources.

Perspiration.

Much yet remains to be learned on the structure and functions of the skin. We have already seen that doubts have existed as to whether absorption is effected by the surface of the body while the outer skin remains entire; but on the power which it possesses of exudation or throwing off matter, or rather of permitting matter to pass, there can be no question. Indeed there does not seem any room to doubt that not only

common perspiration, but foreign and injurious matter, may be excreted from the surface of the body, eliminated from the mass of fluids. This is exemplified, says Blumenbach, in the miasmata of exanthematic diseases, in the smell of the skin after eating garlick, musk, &c.; and, he might have added, in the elimination of gouty matter from the surface of the body, which, under certain circumstances however, is accumulated under the skin, and forms the concretions named chalk stones.

But the matter which principally and constantly finds its way through the skin is the insensible perspiration, which, according to chemical examination, is composed of various proportions of carbon, azote, and nitrogen. The sweat which is occasionally seen standing in drops on the surface of the body seems to be nothing more than this perspirable exhalation in an increased measure; its hydrogen, physiologists tell us, uniting with the oxygen of the atmosphere, and thus giving a liquid or condensed form to the secretion. Upon the same hydrogen, says Blumenbach, variously modified by the accession of other elements and constituents, would seem to depend the natural and peculiar odor perceived in the perspiration and sweat of certain nations and individuals. The quantity of matter, he goes on to say, perspired from the integuments, which in a well grown adult are equal to about fifteen square feet, cannot be accurately estimated, but is probably about two pounds in twenty-four hours. And upon this paragraph we have the following note from Dr. Elliotson:—To ascertain the quantity of watery secretion, Lavoisier and Seguin enclosed the body in a silk bag, varnished with elastic gum, and having a small opening carefully cemented around the mouth, so that, by weighing the body previously and subsequent to the experiment, they were able to ascertain exactly what had been lost; and, by subtracting from this loss the weight of the perspired contents of the bag, they also ascertained how much of this had passed off by the lungs. From repeated trials they found the mean pulmonary discharge in twenty-four hours amounted to fifteen ounces, and the cutaneous to thirty ounces. The quantity of carbon separated by the lungs ought however to be taken into the account. If it amount to eleven ounces in twenty-four hours, the quantity stated by Allen and Pepys, there will be but four ounces of pulmonary exhalation. But, if oxygen and azote are absorbed in respiration, there must have been correspondently more pulmonary exhalation, and Hales estimated it at about twenty ounces in the twenty-four hours. They found the cutaneous transpiration at its minimum during, and immediately after, meals, and at its maximum during digestion.

The minimum after digestion was found by them to be eleven grains per minute, the maximum twenty-two grains; at and immediately after dinner $10\frac{5}{10}$, and the maximum $19\frac{5}{10}$, under the most favorable and unfavorable circumstances. It was increased by liquid, but not by solid food. The pulmonary they regard as greater than the cutaneous, proportionately to the surface on which it occurs. Whatever was taken, the weight was found to become alternately as before. Indigestion lessened transpiration, and the body continued heavier generally till the fifth day, when the original weight was restored. Transpiration was less in moist air and at a low temperature, and the pulmonary and cutaneous transpirations obeyed the same laws.

These observations are sufficient to prove the importance of cutaneous transpiration, and its relation with the pulmonary exhalations; the connexion between the one and the other function has also been traced in a different way; for, as in the instance of inspiration a gas is absorbed and so heat given out, so it is said that in sweat a fluid is formed which has more capacity for heat than the blood, and hence cold is generated. Indeed the production of cold by evaporation from the surface is allowed on all hands; but something further is conceived in the particular now adverted to; and Dr. Currie has ingeniously conjectured that even in the formation of the perspirable fluid, before it makes its way to the surface, a cooling effect is produced upon the principles just adverted to; and he was led to this inference from having observed the cooling effects of immersion under some circumstances in the tepid bath, where there could be no evaporation, and consequently no generation of cold from this source.

It is possible that the laws of chemistry may have been stretched too far in the speculations which physiologists have engaged in concerning this function of cutaneous perspiration in connexion with that of respiration; but the connexion to a certain extent, and in many different ways, is sufficiently manifest, and there is a wide field open for the researches of the chemist, the physiologist, and the pathologist, for the consideration of the respiratory and the transpiratory process in relation the one to the other. We shall have to make a few remarks on this head when considering the subject of urinary affections under the article UREA or URINE, in the body of the work. But we must now proceed to consider the second order of functions marked out by Richerand, viz. those which form connexions with surrounding objects. This order, it will be perceived, comprises three genera, viz. sensations, motions, voice and speech; but on these, as well as on the second class of functions, we shall be exceedingly brief, since digestion, absorption, circulation, respiration, secretion, and nutrition, constitute the principal particulars for physiological consideration, the remainder having to do with NATURAL PHILOSOPHY, NATURAL HISTORY, or METAPHYSICS, and therefore falling to be considered under different divisions of the Encyclopædia. The third genus indeed of the second order we have already commented on under the head of *Respiration;* and we now pass on to a few brief remarks on *Sensations* and *Motions:*—

SENSATIONS.

Of Light.—The rays of light passing through the cornea from any pointof an enlightened object form, as it is stated, a cone, the apex of which answers to the point of the object, and the base covers the anterior part of the cornea Those rays

which do not fall upon the cornea are lost to vision—those which do are refracted by the density of the cornea, and thus turned towards the axis of the eye; when they enter the aqueous humor the refraction of the rays is less, while those which strike upon the lens through the pupil are refracted still more, because this last body has still more density. Those rays which pass upon the membrane called the iris are reflected, and show the color of the eye; the pupil, through which those rays which eventually serve for vision must pass, is contracted or dilated according to the degree of light which enters the eye, provided the retina and optic nerve, of which the retina is a sort of expansion, are in a healthy condition. When the retina is painfully affected by too powerful a light, the pupil contracts in order that admission may be only given to a small number of rays; on the other hand it widens when the light is less vivid that more light may be received upon the visual organ—the retina.

Objects are said to be inverted on the retina, and that we correct the false impression thus made by experience and the assistance of other senses, but this is a mistake; for it ought always to be recollected that it is the sensation of the image, and not the image itself, that is communicated to the sensorium; and the notion of one sense correcting another has been too vaguely taken up and reasoned upon; certain it is, however, that the child's progress in vision and general feeling is a matter partly of experience, though we believe the inferior animals are our superiors in this respect, and conceive of distances accurately immediately upon seeing the light. We not long since saw the first start of a young bird from its nest in a breeding cage: it was to a perch in the cage, and the young stranger perched as accurately upon the part aimed at as if it had had months of experience; and we are told by a celebrated naturalist of a chicken breaking from its egg and immediately obeying the dictates of its nature by darting upon and seizing a spider, that, unfortunately for itself, was crawling past at the moment of the chicken's entering upon this world of destruction.

Besides the controlling motions of the iris, which are directed by the sensibility of the optic nerve, the pigmentum nigrum serves to absorb those rays of light which are too numerous or pungent. The albinos are without this pigment, and are therefore incapable of enduring a strong light. See Optics.

Light in some persons is preternaturally or morbidly short, while in others it is more than commonly long: the former defect is occasioned by the too great convexity of the cornea or prominence of the lens; in the latter there is the opposite conformation of parts. The first defect is lessened as the individual advances in life;—the second is increased by increasing years.

With respect to the external organ we may remark that the brows above the eyes in some measure direct the perspiration of the forehead from trickling into the organs, and likewise prove some defence against too strong a light. The lids too are shades or curtains to prevent the entrance of too strong a light, and to guard against the intrusion of insects or matters floating in the atmosphere; while the tears which are poured out from the lachrymal gland wash away foreign matters from the eyes, preserve their brightness, and facilitate their motions.

Of hearing.—Sound is occasioned by the vibrations excited in a sonorous body, transmitted to and through the air as an elastic medium:—it is propagated with less velocity than light. We hear the report of a gun at a distance after we have seen the flash connected with the explosion. We see lightning and then hear the rumbling of the thunder immediately after.

The human ear is so constructed, even externally, as to collect and concentrate the sonorous rays; but it is the auditory nerve, distributed among the windings of the labyrinth, that receives the impression of sound to convey them to the sensorium. On reaching the bottom of the meatus auditorius these sounds strike against the membrane which is stretched across the tympanum, the cavity of which is filled through the eustachian tube; as the vibrations of the air pass into the meatus, tremulous motions are excited in the interior, which move the malleus and stapes, 'and then institute a due relation between the organ of hearing and the sounds which strike it.' The oscillatory tremors are propagated to the vestibule, the fluid which fills the different cavities of the internal ear receives them, and thus are the branches of the auditory nerves affected, according to the nature and energy of the sounds conveyed, or the degree of integrity in which the organ itself is.

Hearing, like sight, may be peculiar; that is, the individual may be open to the perception of sounds in the one instance, and have his visual organ quite correct in the other,—and yet be without what is called a musical ear, or be unable to distinguish the different shades of color. These varied susceptibilities without any thing in the organs to explain them, have much puzzled both metaphysicians and physiologists; but the phrenologist tells you they are referrible to a particular construction of that portion of the sensorium commune which is destined to receive the perception of color and sound, and he marks out the spot of the brain, as denoted by external configuration, which is wanting in development where these faculties are wanting.

Of smell.—'The principal seat of this sense—the fungous portion of the nasal membrane, besides numerous blood-vessels remarkable for being more liable to spontaneous hæmorrhage than any others in the body, is supplied by nerves; chiefly the first pair which are distributed on both sides the septum narium, and also by two branches of the fifth pair. The former appear to be the seat of smell, the latter for the common feeling of the part that excites sneezing, &c.'

It is supposed by some physiologists that the olfactory nerves do not extend into the sinuses, and that these sinuses only improve the sense by enabling the individual to retain a larger quantity of air, and for a longer time, which is loaded with odoriferous effluvia; it is remarkable that, though the sinuses are scarcely formed at birth, the sense of smell seems sufficiently acute; which is explained upon the principle of general sensibility making up for imperfection in organs

The disgust which the adult feels in the perception of various odors is rather perhaps referrible to the principle of association than to any actual difference of the perception itself between him and the boy. This sense is indeed very curiously the inlet to impressions both of the delightful and disagreeable kind in a remarkable degree. Rousseau very aptly called it the sense of imagination. We may instance the case of an individual turning away from the offensive breath of another, when that degree of disagreeableness would hardly be perceptible did it proceed merely from inanimate matter. Like the other senses it may be much improved by exclusive culture, and it is upon this principle that as well in this as in the instance of any other sense, the loss of one is made up by a more than ordinary acuteness in another. Blind persons can sometimes find out by the sense of smell alone how many individuals are in the room with them.

Of taste.—Each sense has been said to be but in reality a peculiar modification of feeling; of taste this may be said more appropriately than of any other sense; the surface of the tongue, which is its residence, only varying from the skin in being thinner, more vascular, its papillæ being formed in a somewhat different manner, and having cryptæ or follicles which secrete a particular mucus. The sense of taste is generally referred to the lingual branch of the fifth pair; some have supposed that the ninth pair contributes its share to its development; while others regard this last as merely supplying the organ with motive power. The papillæ of the tongue, in which the sense of taste would seem to reside, are certainly supplied from the fifth.

Of feeling and touch.—This has been with some propriety considered the elementary sense,—the generic something of which the others are modifications; indeed we perceive not only some qualities, as heat, hardness, weight, &c., by the touch only, but our knowledge obtained by other senses respecting some qualities is rendered more accurate by the touch; such qualities are figure, distance, &c. In some parts of the surface this sense is peculiarly modified; in the skin, for instance, covering the points of the fingers, here we meet with papillæ which somewhat resemble those of the tongue; but they seem constituted more of nervous projections than secreting cryptæ—they are enveloped in an extremely vascular membrane. When the sense of feeling is brought out, these papillæ are supposed to swell, and raise the epidermis away so as to render the sense more accurate. We may, however, remark that there is no part of anatomical physiology that requires more of remodelling than that connected with the integuments of the body, and this is remarkable, since one should suppose that what is so immediately under the eye would be the easiest to be understood.

The same remark on the varieties of the sense of feeling may be made, as in reference to the other senses, that it is sometimes generally perceptible, while insensible to certain impressions; and that these differences are rather ascribable to varied conditions or conformations of brain than to any difference in the organisation itself, would appear to be made out by the circumstance of apoplectic or paralytic attacks sometimes suspending or abolishing one kind of sense, while they render more acute, another. Indeed it is now, since the researches of Mr. Charles Bell, considered that the muscular fibres, rather than the mere integuments, are the parts in which these variations are actually developed.

Action of the nerves.—On this head every thing is conjectural; for whether we talk of nervous fluid as being the medium of sense, or of oscillations or vibrations, we are equally gratuitous in our assumption, and meet with difficulties at every step in our proposed analogies. That the nervous branches should have ever been supposed vibratory chords, like the strings of a musical instrument, seems astonishing when we reflect upon their form, composition, and modes of connexion; and that they are tubes, conveying a fluid from the cerebral mass, is equally inconsistent with all the phenomena connected with nervous development; this hypothesis would seem especially at variance with what has been called the reacting communication between the centre or centres of sensation, and the organs of sense. Recently the nervous influence has been considered more allied to the Galvanic impulse than any other mode of excitant; and, although vital and other impulses and agencies must be always in some measure regulated upon different principles, we cannot help thinking that more analogy has been traced between sentient excitation and the stimulus of which we speak, than had been hitherto made out.

With respect to the general rationale of sensation, the difference between sensibility and perceptibility, and the comparison of man's intelligence with the instinctive, and sensitive, and loco-motive faculties of the inferior animals; we had contemplated, in this part of our investigation, a few further intimations than those which will be found in the introductory part of the present treatise. Our limits, however, oblige us to forego our intention, which we do with the less concern, since in the article BRAIN, and under the word PHRENOLOGY, will be found, perhaps, as much of metaphysico-physiology as it is proper for us to engage in; the more abstract enquiries on the subject of mind will be found canvassed in the metaphysical articles, and the moral circumstances and responsibilities of our nature are better, perhaps, placed upon other foundations than any which physiology can supply. We shall merely content ourselves in this place by extracting what we have advanced in another publication, and reiterate 'that endeavours to establish an identity of faculty in the man and the brute (if the dispute is not a mere logomachy), have failed of their object: and as we believe that the fables of the Hamadryade are not realised in the trees of our forests; so we still flatter ourselves, notwithstanding the indications of reason, and the great power of imitation which have been exhibited by some individuals of the ape species, that the human intellect is of a nature essentially different from that of the monkey.'

We must, however, stop to fulfil an engagement which we placed ourselves under with the reader, in reference to the new division of the nervous system, which has lately been proposed and fol-

lowed out with much ability by Mr. Charles Bell. The reader, by turning to the article Anatomy, will find that under the word *Physiology* was promised an outline of these new doctrines.

Mr. Bell then takes the entire system of nerves as it is extended from or connected with the brain, including the whole length of the spinal chord. Indeed anatomists now generally speak of cranial brain and spinal brain, rather than of spinal chord, in order to do away with the old opinion, that the nerves are sent out from the brain, as the arteries are from the heart. The view at present generally taken, whether the physiologist be a convert to phrenology or not, is that the whole nervous system is in that sort of communication which is inconsistent with the former notions of origin and distribution of nerve. Mr. Bell supposes, that besides the nerves of sense, as those for vision, smell, hearing, and taste, there are four systems combined into a whole, viz. those for sensation, and those for voluntary motion, arising nearly together but in separate columns; those of respiration, and those which combine the others into a whole, and perform the vital functions. The first two arise in separate columns from the spinal chord (that is, the nerves of sensation and motion); they comprise, beside the spinal nerves generally considered such, the fifth nerves from the brain, according to the common division, and the tenth or suboccipital of some anatomists. These, our author says, are all of double origin (that is, the parts for sensation and the parts for motion are distinct at their roots), they are the nerves of muscular motion, and the general sensibility of the body's surface.

Then come the respiratory nerves of Mr. Bell's arrangement, which are principally sent off from that part which anatomists name the medulla oblongata. They are the par vagum of the eighth pair, the portio dura of the seventh, the accessory of the eighth, the phrenic or diaphragmatic, which is said to be principally formed by a branch from the second, third, and fourth, of the upper spinal nerves; and the external respiratory, having the same origin. All these Mr. Bell calls superadded or respiratory nerves, and he maintains that they are distinct from those of sense and motion; that they do not pass off like them *laterally*, and with *a double origin*; that they are not furnished with gauglia at their roots; and that they do not bestow the faculty of feeling on the parts to which they are distributed.

The nerves which unite the whole are the sympathetic of former anatomists.

Mr. Bell has thus established (provided his views be correct) a distinct system of respiratory nerves, which Dr. Philip, by the way, says ought to have been named pneumo-gastric, from their influence as well over the digestive organs as organs of respiration). He (Mr. Bell) has shown clearly the separate origin of the nerves sense and motion: thus solving a problem which had hitherto puzzled anatomists, and upon which indeed not a ray of light had been thrown since the time of Galen up to the announcement of the discoveries now referred to. M. Magendie seems to wish it thought that he was the original discoverer of this last and most important distinction between nerves of sense and motion, as originating by separate roots in the spinal chord; but, whether the observations of this last very able and indefatigable physiologist were made with or without any assistance from Mr. Bell's announcement, certain it is that Mr. B. was the first to publish the fact, and therefore is justly entitled to the credit of being its discoverer. It ought however to be recollected that with respect to the former division, between brain and spine nerves, Dr. Gordon had already started objections, and that the French physiologists, even previously to Mr. Bell, had shown the connexion which the function of breathing has with that portion of the spinal chord principally in which Mr. B. has demonstrated the origin of the respiratory (pneumo-gastric) system of nerves.

Of Sleep, Dreaming, &c.

The condition and the exciting causes of sleep demand no description; in respect to its proximate cause, or in other words the condition of the brain necessary for its induction, there is considerable obscurity. Blumenbach ascribes sleep to a diminished or impeded flow of arterial blood to the brain; for that fluid, he says, is of the highest importance, during the waking state, to the reaction of the sensorium upon the functions of the senses, and upon voluntary motions; on this opinion, his commentator, Dr Elliotson, makes the following very judicious remarks:—'The alteration of circulation is usually not the cause but the consequence; necessary, indeed, to the continuance of the altered degree of activity in the organ, but not the cause. If the circulation through a part be mechanically increased or diminished, the sensibility and activity of the part will doubtless be proportionally increased or diminished. But in ordinary sleep the diminished circulation appears only the consequence; for inactivity always follows activity.' We conceive this distinction to be important between vascular conditions as a mere circumstance and cause—a distinction which pathologists as well as physiologists would do well to recognise in some of their speculations and practice respecting nervous derangements. An exhausted or depressed nervous energy is doubtless the cause of drowsiness coming upon an individual which ends in sleep; but the altered condition of the circulation would appear to be a mere consequence, or at any rate only a concomitant.

Pressure on the brain will produce an artificial sleep, but this is a condition rather allied to apoplexy than true sleep, and no inference can be drawn from it: indeed, till we know more than we at present do, respecting the primary and directing changes in the nervous organisation, the cause of sleep must, as well as the cause some nervous conditions, be quite obscure.

We believe that if Richerand, who remarks, on the subject of somnolescence, that the human body presents, with tolerable accuracy, the model of the centripetal and centrifugal powers of ancient philosophy, the motion of several of the systems that enter into its structure is directed from the centre to the circumference; it is a true exhalation that expels the produce and continual

destruction of organs; such is the action of the heart, arteries, and all secretory glands. Other actions, on the contrary, are directed from the circumference to the centre, and it is by these means that we continually receive from the aliments introduced into the digestive organs the air that penetrates into the internal structure of the lungs, and surrounds the surface of the body, the elements of its growth, and reparation. These two motions in an opposite direction continually balance each other, and alternately preponderate according to age, sex, sleep, or waking. During sleep the motions are directed from the circumference towards the centre (motus in somno introvergunt, Hippocrates); and, if the organs that connect our intercourse with external objects repose, the internal parts act with greater advantage.' Hence our author would explain, or rather trace, the connexion of repose with corpulence; and of inordinate mental or bodily exercise with leanness. Sleep may indeed be so indulged as to reduce man to a condition of mere brutal existence, as in a case related by the author of the above extract, viz. that of a man sleeping five-sixths of the day with a digestion always active and easy, and with moral affections circumscribed in the desire of aliment and repose.

Boerhaave also speaks of a German physician, who maintained that sleep was the natural state of man; that when he was awake he was in a state of disease, and he so acted up to his theory that he brought on apoplexy as a consequence of his inordinate indulgence.

Dreams are certainly sportings, as Blumenbach calls them, of the imagination; but as in the condition of sleep it is difficult to conceive the precise condition of the sensorial organ or organs which shall simulate the condition of wakefulness, or rather cause the consciousness of being awake, and walking, and eating, and drinking, and speaking, while the individual is actually lying upon his pillow and not making any of these supposititious exertions, unless indeed when dreaming is carried to the height of somnambulism, or walking in the sleep; here indeed the individual, like the man who is insane, reasons and even acts correctly, but without reference to other balancing and correcting principles which both actuate and restrain in the state of wakefulness or sanity. Phrenological speculators have argued with a great deal of ingenuity on these conditions, under the assumption that they imply the activity of one or more organs, while the rest are in a contrary state, and that therefore do we witness all the confusion, and irregularity, and want of restriction or restraint, which characterise dreaming and somnambulancy and madness.

Sympathies.—In respect to these it may be remarked that they exist sometimes between organs, the nervous connexion of which can be traced, and in these instances the phenomena they produce are in one sense of easy explication; but at other times they are displayed between organs which one should anatomically infer are any thing but in a state of combination: in these last instances the laws which regulate them are more obscure. What Dr. Darwin calls reverse sympathy is a curious circumstance, viz. the cessation of an irritative action in one part, being succeeded by a like action in another, and that with some degree of regularity: for instance, the skin will be covered by the eruption of measles on one day, and on the next this eruption shall be found to have prematurely subsided, and the internal membrane lining the lungs to have taken on a disordered action in consequence. Then again there is a sympathy which is in some measure inexplicable between opposite extremities of a continuous membrane, as is exemplified in the instance of ascarides in the rectum occasioning an itching of the nostrils; now why this should take place only at opposite extremities or particular points of the membrane, and not continue through its whole course, does not seem of very easy explanation. Sympathy has been applied as a term to those actions in the system which seem especially to be under the influence of final cause, if we may so say, as when the rectum contracts by the stimulus of excrement, and the sphincter ani relaxes as a consequence of that contraction.

Habit.—No one requires any illustrations of the potency of habit. Who does not know that even miscarriage is liable to recur merely from its influence, and that thousands both of natural and morbid circumstances establish themselves, as parcel of mind and body, under its entire influence. We do feel persuaded that those lessons of morality would be most efficient which should present to the mind in lively colors, and with reiterated impression, the dangerous force of this most dangerous power, when suffered to gain an ascendance under a wrong bias.

Animal motions.—Muscularity is the great organ of loco-motion, and all the modifications of it are traceable to the different manner in which muscles are attached to bones. Now 'a property common to all muscles, and the immediate consequence of their irritability, is to become shorter, more rigid, and generally unequal, and as it were angular during contraction. Prevost and Dumas assert that the muscular fibres, straight while at rest, approximate each other at intervals under contraction, so as to acquire a zigzag course and shorten the distance of their two extreme points. They ascertained satisfactorily that during contraction no increase of volume is acquired. If muscles while the fibres are straight are stretched still more, as continually happens in the muscular coats of cavities, the subsequent shrinking to the original dimension is unattended by the zigzag appearance. Nervous filaments, they also assert, go perpendicularly to the muscular fibre at the very points where the angles are formed under the zigzag contraction, and yet not to terminate there or unite with the muscular fibres, but to return or anastomoze with other nerves. The approximation of the nervous filaments to each other is thought to draw the muscular fibres into angles, and thus be the cause of muscular contraction. The approximation of the nervous filaments is considered an electric phenomenon. Electricity will effect it; and in whatever way it is effected, electric appearances are said always to be discoverable.

Muscular power is no where more displayed

than in some fish. 'I have seen,' says Sir Gilbert Blane, 'the sword of a sword fish sticking in a plank, which it had penetrated from side to side; and when it is considered that the animal was then moving through a medium even a thousand times more dense than that through which a bird cleaves its course at different heights of the atmosphere, and that this was performed in the same direction with the ship, what a conception do we form of this display of muscular power. Muscular strength is proportionably much greater in smaller animals. A flea can draw from seventy to eighty times its own weight, whereas a horse cannot draw with ease more than three times its own weight.

The functions now to be considered are those in the second class of Richerand's system of arrangement; they serve for the preservation of the species, and are divided into two orders, the first of which require the concurrence of both sexes, the second exclusively belong to females. On these functions we shall, for reasons already stated, be exceedingly brief.

On the Differences of the Sexes.

During infancy we find the general characteristics of sex comparatively so indistinct that some physiologists have been disposed to refer the successive development of the male and female peculiarities solely to the generative organs. Propter solum uterum mulier est id quod est: Van Helmont. There is, however, some error in this conclusion; for we find that even from the birth some measure of difference is perceivable between the male and the female; the former having less mobility of constitution, and less delicacy and roundness of form than the latter; as the child grows this difference becomes more and more evident, the muscles of the boy become larger and firmer, the face and head more expanded, the sharpness of the bones more decided, and as youth falls into puberty the difference now is much more striking; the chest is more expanded in the male, the breasts do not as in the female become large and round, the hips are smaller in proportion to the chest, the body generally is more sinewy, and muscular, and angular; hair covers the chin, and the larynx, as marked by change of voice, is much altered. The pulse too in the male is for the most part less frequent than in the female, the stomach and appetite for food is greater, while the growth of the body is less rapid, and the several periods of dentition, puberty, and acme of stature later.

Hermaphroditism.—The sexes are sometimes, but very rarely, dubious; but the combination of the two sexes in one individual, is a mere poetical fancy, at least in the human, and in animals that bear the smallest resemblance to man. We mean the completion of the two sexes in one individual; for it certainly does appear that in a few very rare cases the organs are so formed as that the individual is neither of one sex properly, nor of the other. We saw some time since, in London, a person who was exhibited as an hermaphrodite, and it was stated that this person possessed the sexual desires and capabilities of enjoyment of both sexes, and certainly as to external form and even to genital formation there appeared a complete union of the sexes; but we are very doubtful whether the statements in reference to propensities and powers were not invented, or at least exaggerated. The mammæ in this case were beautifully formed and developed. The limbs had the round contour of the female; the voice, if we recollect right, was feminine; and the whole appearance indicated voluptuousness. But on the other hand the chin was covered with beard, there was more hair generally than is seen about the female, and it was stated that both the urine and the menses passed through a projecting body which appeared like an enlarged clitoris, only that there was the indication of an urethra and five small orifices at its under part. The question here was whether an uterus and ovaria existed; and until the death and examination of the person, this question must remain unsettled. We merely allude to the case as the most marked instance that has come within our own personal knowledge of dubious or mixed sex.

Some physiologists have traced a close analogy between the sexual organisation of the male and female, comparing the ovaria of the latter with the testicles of the former, the Fallopian tubes with the vasa deferentia, the uterus with the vesiculæ seminales, the clitoris with the penis, the nymphæ with the preputium; and to such an extent has this been carried by Sir Everard Home that he conceives the sexes are at their first formation hardly determined, but capable of passing from one into the other. These, however, seem fanciful and unstable opinions.

Genital function in man.—The generative process in man is affected by a diminution from the blood of the seminal secretion; this secretion is of a yellowish color, of a peculiar odor, of mucous viscidity, and great specific gravity; it has been found, also, to be formed of an infinite number of animalcules, which in the human semen are of an oval form, and have very fine tails; the semen, inmmediately upon its secretion, passes the vasa deferentia, and enters the vesiculæ seminales; what alteration it here undergoes does not seem quite certain, or whether the vesiculæ are not merely reservoirs for it. It was stated by Richerand that they lessened the time of copulation, and that those animals, as the dog, who are without them are therefore longer in coitu; but in this he has been led into an error by too partial observation. As the semen in man passes through the prostate gland it is mixed with the mucus which this gland secretes, and is projected through the uterus with it. 'The emission of semen is excited by its abundance in the vesicles, and by sexual instinct; it is effected by the violent tentigo which obstructs the course of the urine, and, as it were, throws the way open for the semen; by a kind of spasmodic constriction of the vesiculæ seminales; by a convulsion of the levatores ani and of the acceleratores urinæ; and by a succussion of the whole system, short and less violent, though almost of an epileptic nature, and followed by a depression of strength.'

Genital function in the female.—The question of how far the semen is propelled into the genital organs of the female does not seem to be

quite settled; and, indeed, there still remains some difference of opinion, as to the part which the female performs in the process of generation. It was formerly thought that the ovaria secreted a seminal fluid, which mixing with the male semen in the uterus, impregnation was the result of the union; that notion is now, however, pretty generally abandoned, but it is still supposed that the ovarium prepares something essential to generation, since its removal renders the female sterile. Some imagine that an actual contact of the ovum and semen is necessary, and it is imagined that the semen is absorbed into the uterus, where it is met by the ovum which has descended through the Fallopian tubes. It is even supposed by some physiologists that an actual absorption of the semen from the vagina to the ovum takes place; in confirmation of this opinion, Dr. Gartner of Copenhagen discovered a passage leading from the ovarium to the vagina. Dr Blundell, who has given his attention much to this subject, supposes that a sort of peristaltic motion is performed by the vagina and womb, occasioned by the stimulus of the semen, and that by this action the semen is conveyed to the rudiments: it is his opinion that the aura seminalis is not sufficient for impregnation, but that the semen of the male must come in contact with the rudiments. This is a return to the old doctrine of impregnation before the time of Harvey, and is most probably the correct one.

A question remains respecting the bursting of the Graffian vesicles, whether this is effected merely by the influence of the semen or from the mere excitation connected with the venereal act, the semen only then impregnating the contents of the vesicles when they shall have escaped from the ovaries. There seems some difficulty in determining this point, but at any rate it is pretty generally understood that these vesicles may burst and their contents be discharged without actual impregnation; so that corpora lutea, or the remaining yellow bodies after the rupture of the vesicles, are not properly regarded as the test of impregnation.

In what manner the semen operates upon the ovarian secretion, so as to fecundate, seems beyond human power to divine. The ingenuity of man has not, however, been idle on this recondite subject, and the most fanciful and absurd speculations have been put forth as solutions of the question. It has been supposed that the animalculæ of which the semen is constituted pass in a current through the Fallopian tubes to the ovaria, where they enter into a violent contest—that all are killed except one, which, being left champion in the field of battle, penetrates into the ovarium destined to receive it. According to the hypothesis of M. Buffon, every part of the body furnishes its appropriate moleculæ to compose the semen, 'and these atoms coming from the eyes, ears, &c., of the man and woman, arrange themselves round the internal mould, the existence of which he admits, believing it to form the base of the edifice, and to arise from the male if it should be a boy, and from the female if a girl.

It has been properly remarked, upon this wild and fanciful hypothesis, that, were it necessary to offer any objection to it, the fact that infants are often born perfectly organised, the parents of whom had some defect in structure, would be sufficient to refute it.

For the other particulars mentioned in this part of the classification we refer to the article MIDWIFERY.

OF AGES AND TEMPERAMENTS.

An infant is born but with a very imperfectly formed epidermis, hence its general redness of appearance; this, however, is soon developed upon the surface, the redness and roughness of the skin disappear, the down which covered the face falls off, and the wrinkles are effaced. For the first month or two the child seems to requi nothing but nourishment and sleep; it at length, and gradually, becomes accustomed to the impression of exterior objects, as well as to its own internal sensations, and the gradual development of the understanding is exceedingly interesting. 'Towards the middle of the second month it becomes capable of agreeable sensations. If it feels them before that time, at least, it is only then that it begins to express them by laughing.'

Teething.—This process commences with some degree of irregularity; but it is generally believed that in the seventh or eighth month the teeth begin to show themselves, and the following order, with some deviation, is observed; the middle incisions first appear in the upper gums, then the corresponding under incisions, then the lateral incisions of the upper jaw, followed by the lower, and the cuspidate appear in the same order. It is not, in general, till towards the second year that the molar teeth make their appearance, and these come out in the reverse order, those of the inferior jaw appearing first. The teeth, are now twenty in number; at the end of the fourth year, two new grinders are added in each jaw. These last during life, while the first, or milk teeth, as they are called, are shed in the same order in which they appear, and new teeth better formed and larger, take their place. This last change takes place when the child is seven years old. About the ninth year two large grinders make their appearance beyond the others, and the dentition is now complete with twenty-eight teeth. It is usually after the age of eighteen, and sometimes later, that the dentes sapientiæ, two in each jaw, present themselves.

This double range of teeth actually exists in the jaw of the fœtus. 'Each alveolar process contains two membranous follicles, lying one over the other. That which is to form the primitive tooth swells the first, a calcareous matter covers its surface and forms the body of the tooth, which invades also the follicle by which the osseous part is secreted; so that, the growth of the little bone being completed, the membranous vesicle, in the parietes of which the dental vessels and nerves branch out, is found in the centre of its body, and adheres to the parietes of its internal cavitiy. It is difficult to say why the growth of the dental germs is successive; why in the seventh year the primitive teeth are detached and are replaced by others which have remained so long buried within the alveolar processes. Dentition is like all other pheno-

mena of the living economy; it is subject to endless varieties in its period, duration, &c. Thus teeth of a third set have been known to be cut in very old people. There are instances, but they are very scarce, of children that have come into the world with two incisores in the upper jaw.'—Richerand.

For an account of the process of ossification in general see the article Bone.

Puberty.—In this country the season of puberty is scarcely ever sooner than the fifteenth year, and often much later, if the constitution is not very forward. Its principal marks are, as we have above noticed, the change of voice, arising from laryngial changes and a sudden dilatation in the aperture of the glottis. In females the change is mainly marked by the appearance of the menstrual discharge, and by the enlargement of the breasts, 'neque enim vox mutatur, neque barba venit.'

Manhood.—The twenty-first year is legally marked as the period of manhood. 'It may be considered,' says Richerand in his excellent treatise on physiology, 'as beginning from the twenty-first to the twenty-fifth year. Then all increase of the body in height is at an end; the processes are completely united to the body of the bones: but still growth goes on in other dimensions. All the organs acquire remarkable hardness, solidity, and consistency. It is the same with the intellectual and moral faculties. To the empire of imagination succeeds that of judgment, that is capable of fulfilling all the duties of family and society. This period of life, to which we give the name of mature age, extends to the fiftieth or fifty-fifth year for men; it scarcely goes beyond the forty-fifth for women, with whom it begins also a little sooner. During this long interval men enjoy the whole plenitude of their existence.'

Temperament.

On this head we give the following extract from Dr. Uwins's work on diseases connected with indigestion.

'It would seem natural enough to suppose that an individual from birth might be endowed with more or less of vigor, not merely of constitution generally, but in one or other of the media, so to say, of vital causation; and such we find the fact.

One person, without being generally feeble, will prove from his cradle to his grave to be what is called nervous; that is he may be firmly made and accoutred by nature, so far as the mere ground work of the machinery goes; he may have a bone compact in its structure and large in its dimension; he may possess a muscle that shall forcibly contract in obedience to the mandates of the will; he may be furnished with blood-vessels ready and able to act with freedom and facility under the order of the circulating impulse; an absorbent energy prepared to take up the nutritive, and an excernent power to throw off effete matter;—and yet shall be in one sense or in one particular a weakly individual; that is, the organs which are destined by nature to receive and transmit sentient impressions shall be so constructed as to run rapidly into a disordered state from the slightest source of irritation; to be morbidly acute at one time, unduly torpid at another, and never in that condition of tone or strength which is consistent with a firm or regular performance of function.

In another individual we shall find the circulation of the blood to be that function which shall be most easily pushed into a deranged condition by disease, creating impulse. His feeling is by no means morbidly acute; his lymphatic organisation and absorbent energy are so adjusted to the requisites of the frame that he has no tendency to glandular ailment, no readiness to be affected through any portion of the secretory or excretory system, and yet expose him to sources of irritation, and you will find the result manifest itself in partial or general disorder of blood-vessels; hæmorrhages will easily occur; inflammation will be prompt to establish itself; the individual is of a sanguine temperament.

The lymphatics of a third individual are the parts upon which disorder most readily fixes. In this instance the perfective organisation may be developed with a due regard to healthy proportion; the blood-vessels, when once supplied with their material of circulation, may circulate freely; the brain and the heart, the centre and sources of the perceptive and vascular impetus, may be both in the best condition of susceptibility; and yet the supplying and discharging portion of the frame shall be so feeble in its structure, and so morbid in its excitability, as to be constantly obnoxious to disease. In this case that kind of constitution exists which is vulgarly called scrofulous, and which, notwithstanding all our recent refinements in phraseology, in spite of all our attempts to generalise and simplify, cannot but be received as consisting in 'a particular condition of the lymphatic system.'

'In the above sketch,' continues the author from whom we extract, 'we must enter our protest against a desire of being understood as precise and determinate. The divisions, after all, are in one sense ideal; and we find in nature no prototype of absolutely unmixed constitution. The lymphatic falls in with the sanguine, the nervous with the lymphatic, the sanguine with the nervous, in such sort that you can never predicate any thing beyond apparent predominance and frequently hardly that. The ancient doctrine of temperament was objectionable because it did not sufficiently recognise these endless mixtures, and because it assumed the existence of a something tangible—a materies, upon which the difference in constitution is founded. We actually know nothing beyond the fact of varied susceptibility; we are still ignorant of the cause upon which the variety depends.'

Varieties of the Human Species.

Richerand follows Lacépède in making four principal varieties of the human species:—The European Arab, the Mogul, the Negro, and the Hyperborean. 'We might add,' he says, 'a fifth, the American, were it not most probable that the new continent is peopled by inhabitants who, coming from the old either by land in the austral hemisphere, or along the immense archipelago of

the Pacific Ocean, have been altered by the influence of that climate, and the yet virgin soil, so that they are to be regarded less as a distinct race than a simple variety.'

Cuvier's division is into, 1. The Caucasian; 2. The Mongolian; 3. The Negro; while Blumenbach's, which we believe to be the most generally approved, is into five varieties:—The Caucasian, Mongolian, Ethiopian, American, and Malay. We cannot but avail ourselves here of the very interesting account given by Dr. Elliotson of these varieties.

1. *The Caucasian.*—The skin white; the cheeks red,—almost a peculiarity of this variety; the hair of a nut-brown, running on the one hand into yellow, and on the other into black, soft, long, and undulating. The head extremely symmetrical, rather globular; the forehead moderately expanded; the cheek bones narrow, not prominent, directed downwards from the malar process of the superior maxillary bone; the alveolar edge round; the front teeth of each jaw placed perpendicularly. The face oval, and pretty straight; its parts moderately distinct, the nose narrow and slightly aquiline, or at least its dorsum rather prominent; the mouth small; the lips, especially the lower, gently turned out; the chin full and round:—in short the countenance of that style which we consider the most beautiful.

This comprehends all Europeans except the Laplanders and the rest of the Finnish race; the western Asiatics as far as the Obi, the Caspian, and the Ganges; and the people of the North of Africa.

2. *The Mongolian.*—The skin of an olive color; the hair black, stiff, straight, and sparing. The head almost square; the cheek bones prominent outwards; the space between the eyebrows, together with the bones of the nose, placed nearly in the same horizontal plane with the malar bones; the superciliary arches scarcely perceptible; the osseous nostrils narrow; the fossa maxillaris shallow; the alveolar edge arched obtusely forwards; the chin somewhat projecting. The face broad and flattened, and its parts consequently less distinct; the space between the eyebrows very broad as well as flat; the cheeks not only projecting outward, but nearly globular; the aperture of the eye-lids narrow,—linear; the nose small and flat.

This comprehends the remaining Asiatics, except the Malays of the extremity of the Transgangetic peninsula; the Finnish races of the North of Europe,—Laplanders, &c.; and the Esquimaux diffused over the most northern parts of America, from Behring's Strait to the farthest habitable spot of Greenland.

3. *Ethiopian.*—The skin black; the hair black and crisp. The head narrow, compressed laterally; the forehead arched; the malar bones projecting forwards; the osseous nares large; the malar fossa behind the infra-orbitar foramen deep; the jaws lengthened forwards; the alveolar edge narrow, elongated, more elliptical; the upper front teeth obliquely prominent; the lower jaw large and strong; the cranium usually thick and heavy. The face narrow, and projecting at its lower part; the eyes prominent; the nose thick and confused with the projecting cheeks; the lips, especially the upper, thick; the chin somewhat receding. The legs in many instances bowed.

This comprehends the inhabitants of Africa; with the exception of those in the northern parts, already included in the Caucasian variety.

4. *The American.*—The skin of a copper color; the hair black, stiff, straight, and sparing. The forehead short; the cheek bones broad, but more arched and rounded than in the Mongolian variety, not, as in it, angular and projecting outwards; the orbits generally deep; the forehead and vertex frequently deformed by art; the cranium usually light. The face broad, with prominent cheeks, not flattened, but with every part distinctly marked if viewed in profile; the eyes deep; the nose rather flat, but still prominent.

This comprehends all the Americans excepting the Esquimaux.

5. *The Malay.*—The skin tawny; the hair black, soft, curled, thick, and abundant. The head rather narrow; the forehead slightly arched; the parietal bones prominent; the cheek-bones not prominent; the upper jaw rather projecting. The face prominent at its lower part; not so narrow as in the Ethiopian variety, but the features, viewed in profile, more distinct; the nose full, broad, bottled at its point; the mouth large. This comprehends the inhabitants of the Pacific Ocean, of the Marian, Philippine, Molucca, and Sunda Isles, and of the peninsula of Malacca.

General remarks.—The color of the hair thus appears somewhat connected with that of the skin, and the color of the iris is closely connected with that of the hair. Light hair is common with the white and thin skin only, and a dark thick skin is usually accompanied by black hair; if the skin happens to be variegated, the hair also is variegated; with the cream-white skin of the albino we find hair of a peculiar yellowish white tint; and, where the skin is marked by reddish freckles, the hair is red. When the hair is light the iris is usually blue; when dark it is of a brownish black; if the hair loses the light shade of infancy, the iris likewise grows darker, and, when the hair turns gray in advanced life, the iris loses much of its former color; the albino has no more coloring matter in his choroid or iris than in his skin, and they therefore allow the redness of their blood to appear, the latter being of a pale rose-color and semi-pellucid, the former, from its greater vascularity, causing the pupil to be intensely red; those animals only whose skin is subject to varieties vary in the color of the iris; and, if the hair and skin happen to be variegated, the iris is observed likewise variegated.

The Caucasian variety of head, nearly round, is the mean of the rest, while the Mongolian, almost square, forms one extreme, having the American intermediate, and Ethiopian the other extreme, having the Malay intermediate between it and the Caucasian.

The Caucasian variety of face is also the mean, while the Mongolian and American, extended laterally, form one extreme, and the Ethiopian and Malay, extended inferiorly, constitute the other. In the first of each extreme, viz. the

Mongolian and Ethiopian, the features are distinct, while in the second, viz. the American and Malay, they are somewhat blended.

Although this division of mankind is well founded and extremely useful, it is liable, like every artificial division of natural objects, to many exceptions. Individuals belonging to one variety are not unfrequently observed with some of the characteristics of another; the characteristics of two varieties are often intimately blended in the same individual (indeed all the four varieties run into each other by insensible degrees); and instances continually occur of deviation in one or more particulars from the appearances characteristic of any variety: so that the assemblage rather than individual marks must frequently be employed to determine the variety.

Particular remarks.—The Caucasian variety is pre-eminent in all those mental and corporeal particulars which distinguish man from brutes. It is to the two sexes of this variety that Milton's lines apply:—

For contemplation he and valor formed;
For softness she and sweet attractive grace.

The cranium is very capacious, the area of the face bears to its area but a proportion of one to four, and projects little or not at all at the lower parts: the intellectual faculties of its individuals are susceptible of the highest cultivation, while the senses of smelling, hearing, and seeing, are much less acute than in dark nations. Philosophy and the fine arts flourish in it as in their proper soil.

The Ethiopian variety, when instructed by the Caucasian, has produced instances of mental advancement great indeed, but inferior to what the latter is capable of attaining. 'There scarcely ever,' says Hume, 'was a civilised nation of that complexion, nor even an individual, eminent either in action or speculation. No ingenious manufactures amongst them, no arts, no sciences. On the other hand, the most rude and barbarous of the whites, such as the ancient Germans, the present Tartars, have still something eminent about them, in their valor, form of government, or some other particulars.' Blumenbach, however, possesses English, Dutch, and Latin poetry written by different negroes, and informs us that, among other examples of distinguished negroes, a native of Guinea, eminent for his integrity, talents, and learning, took the degree of doctor in philosophy at the university of Wittemberg, and that Lislet, of the isle of France, was chosen a corresponding member of the French Academy of Sciences. 'Provinces of Europe,' says he, 'might be named, in which it would be no easy matter to discover such good writers, poets, philosophers, and correspondents of the French Academy; and, on the other hand, there is no savage people which have distinguished themselves by such examples of perfectibility, and even capacity for scientific cultivation, and consequently that none can approach more nearly than the negro to the polished nations of the globe.' This mental inferiority is attended of course by a corresponding inferiority of the brain. The circumference, diameters, and vertical arch of the cranium, being smaller than in the European, and the forehead particularly being narrower and falling back in a more arched form, the brain in general, and particularly those parts which are the organs of intellect, properly so called, must be of inferior size. The orbits, on the contrary, and the olfactory and gustatory, or, rather, masticatory, organs being more amply evolved, the area of the face bears a greater proportion to the area of the scull,—as 1·2 to 4·; the proportion is greater in the orang-outang, and in the carnivora nearly equal. The senses here situated, as well as that of hearing, are astonishingly acute, though not only in this, but also in the three following varieties, and the corresponding nerves, at least the first, fifth, and facial, of great size.

The ossa nasi lie so flatly as to form scarcely any ridge; the face, as we have formerly seen, projects considerably at its lower part; the lower jaw is not only long but extremely strong; the chin not only not prominent but even receding, and the space between it and the lower teeth is small, while that between the upper teeth and the nose is large; the meatus auditorius is nearer the occiput,—more remote from the front teeth than in the European; the foramen magnum occipitale lying farther back, the occiput is nearly in a line with the spine; the body is slender, especially in the loins and pelvis, whose cavity likewise is small; the length of the fore-arms and fingers bears a large proportion to that of the os humeri; the os femoris and tibia are more convex, and the edge of the latter, according to a remark of the late Mr. Fyfe of Edinburgh, very sharp; the calves are placed high; the os calcis, instead of forming an arch, is on a line with the other bones of the foot, which is of great breadth; the toes are long; the penis large and frequently destitute of frænum. Mr. White, from whom many of these remarks are derived, describes the testes and scrotum as small. Mr. Billmann of Cassell has observed that the stomach is shorter, more globular at its cardiac extremity; and the observation is confirmed by Soemmerring, who finds that of the ape still shorter; the skin is thicker, and, finally, the term of life generally shorter, than in Europeans.

Nearly all these facts demonstrate rather a less distance of the negro than of the European from the brute creation. But with an inferiority to the Caucasians so slight, if compared with his immense superiority over the most intelligent brutes, so incessantly running into the Caucasian and all the other varieties, so liable to innumerable diversities of conformation as well as bearing some resemblance to brutes, and so certainly bearing no more resemblance to them in some points nor so much in others as many tribes of other varieties, the poor negro might justly class those of us who philosophically view him as merely a better sort of monkey, or who desire to traffic in his blood, not only below himself, but below apes in intellect and below tigers in feeling and propensity.

Indica tigris agit rabida cum tigride pacem
Perpetuam. Savis inter se convenit ursis.

'The unconscious admiration which that traveller detected himself in bestowing upon the native beauties affords,' says the writer of a critique

of major Denham's Travels in Africa, 'one more example of this truth, that, however much Europeans have doubted whether negroes were men, there has never been a difference of opinion as to whether negresses were women.'

'The skin of the negro has a peculiar velvet-like softness, and is lubricated by an oily secretion. The Malays have but little hair upon the chin, and possess a great development of the parts of the head above the ears. The Mongolians are remarkably square and robust; their shoulders high, their extremities short and thick. The Americans have small hands and feet, and are nearly destitute of beard. Shorter in the forehead than the Mongolians, they have not so great intellectual distinction.

Not only have the five varieties their distinctive characteristics, but the different nations comprehended in each variety have each their peculiarities, both mental and corporeal: among the Caucasian, for example, the Germans, French, Spaniards, and English, are extremely different from each other. Nay the provinces of the same country differ, and the families of the same province: and, in fact, every individual has his own peculiar countenance, figure, constitution, form of body and mental character.

After this interesting commentary on the classification of Blumenbach, Dr. Elliotson proceeds by saying, 'a question here presents itslf: are the differences among mankind to be ascribed to the influence of various causes upon the descendants of two, or of more, but all similar, primary parents, or to original differences in more than two primary parents?'

He decides in favor of the opinion that 'we are all brothers,' or originate from one common parentage, first from the general simplicity of nature's laws; secondly from analogical facts leading to the conclusion that none of the differences of mankind are so great as to require the belief of their originality; and, thirdly, direct facts, he says, harmonise with this conclusion. All races run insensibly one into another, and therefore innumerable intermediate examples occur when the distinction between two varieties is lost.

He illustrates these positions by an appeal to a vast number of historical facts; by a consideration of the immense influence of time, place, and circumstance: and by reasonings and inferences taken from natural history, which it would give us pleasure to follow were we permitted by our limits. His conclusion from the whole survey is stated in the following words:—

'On account of all these facts, and of the consideration that a child is continually produced differing remarkably from both its parents, and that such an individual, born in ancient times, might have given origin to a large nation resembling himself, I can discover no reasons for not believing that we all sprung from two parents.'

PHYS'Y, *n.s.* The same with fusee. See FUSEE.

Some watches are made with four wheels, some have strings and *physies*, and others none. *Locke.*

PHYTIV'OROUS, *adj.* Gr. φυτον, and *voro*, to devour. That eats grass or any vegetable.

Hairy animals, with only two large foreteeth, are all *phytivorous*, and called the hare-kind. *Ray.*

PHYTOLACCA, pokeweed, or American nightshade, in botany, a genus of the decagynia order and decandria class of plants; natural order fifty-fourth, miscellaneæ. It grows naturally in Virginia, and has a thick, fleshy, perennial root, divided into several parts as large as middling parsnips. From this rise many purple herbaceous stalks, about an inch thick, and six or seven feet long, which break into many branches, irregularly set with large, oval, sharp-pointed leaves, supported on short foot-stalks. These, at first, are of a fresh green color. But as they grow old they turn reddish. At the joints and divisions of the branches come forth long bunches of small bluish-colored flowers, consisting of five concave petals each, surrounding ten stamina and ten styles. These are succeeded by round depressed berries, having ten cells, each containing a single smooth seed. In Virginia and other parts of America the inhabitants boil the leaves, and eat them in the manner of spinach. They are said to have an anodyne quality; and the juice of the root is violently cathartic. The stems, when boiled, are as good as asparagus. The Portuguese had formerly a trick of mixing the juice of the berries with their red wines, to give them a deeper color; but as it was found to debase the flavor, and to make the wine deleterious, the king of Portugal ordered all the stems to be cut down yearly before they produced flowers. The phytolacca decandria is still however used both in Portugal and England for the coloring of wine. The same practice was common in France till it was prohibited by an edict of Louis XV. This plant has been said to cure cancers.

PHYTON, a general of the people of Rhegium, against Dionysius, the tyrant of Sicily. He was taken by the enemy, and tortured, and his son was thrown into the sea, A.A.C. 387. See SYRACUSE.

PHYXIUM, an ancient town of Elis.

PIA, or PIALIA, festivals instituted in honor of Adrian, by the emperor Antoninus Pius. They were celebrated at Puteoli on the second year of the Olympiads.

PIABA, in ichthyology, is a small fresh-water fish, caught in the rivers and brooks in the Brasils, and in some other parts of America. It is about the bigness of the common minnow; is well tasted and much esteemed by the natives.

PIABUCU, in ichthyology, an American fish, eaten in many places by the natives. It is said to be very ravenous and greedy of blood. It seldom exceeds four inches in length.

PIACENZA, or PLACENTIA, a gloomy town of the north of Italy and duchy of Parma, situated in an extensive plain, near the right bank of the Po, not far from its junction with the Trebia. It is surrounded by earthen ramparts, and defended by a castle. Of its streets, a few are broad and straight, but most of them are narrow and winding; the most spacious is the Stradona; but it has the appearance of a road,

being bordered with gardens and a dead wall. The palazza publico is in the only square of consequence. In another is situated the ducal palace, a building of considerable extent, but of little architectural merit; and the cathedral, remarkable only for its heaviness and bad taste. It contains, however, a number of fine paintings. The theatre is neat and commodious. Here is also a university of no great note; but the town library contains 30,000 volumes; and there are several extensive private collections. Piacenza is a place of little activity; it has, however, manufactures of silk stuffs, woollen, fustian, stockings, and hats; also a great yearly fair held in April. It was the birthplace of pope Gregory X. and of cardinal Alberoni. In June, 1799, the French were defeated in the neighbourhood, in a very sanguinary conflict with Suwarrow. Population 20,000. Thirty-two miles W.N.W. of Parma, and thirty-four south-east of Milan.

PIACENZA, or the PIACENTINO, a duchy of Italy, in the Parma States, extending from the Appennines to the Po. It is about thirty-six miles in length from north to south, and from ten to eighteen in breadth from east to west. It is a fertile tract, producing corn, wine, oil, silk, and chestnuts. The hilly part contains mines of iron, copper, and vitriol.

PI'ACLE, *n. s.* } Lat. *piaculum*, *piacularis*.
PIAC'ULAR, *adj.* } A crime: expiatory; hav-
PIAC'ULOUS. } ing the power to atone; such as requires expiation.

When the profession (Pharisaism) began no history recordeth. Some would fain fetch them from Isa. lxv. 5. But these strain too far; for, in the verse before, the same men eat swines' flesh which to the Pharisees is more than *piacular*. *Bp. Hall.*

To tear the paps that gave them suck, can there be a greater *piacle* against nature, can there be a more execrable and horrid thing? *Howel.*

While we think it so *piaculous* to go beyond the ancients, we must necessarily come short of genuine antiquity and truth. *Glanville.*

It was *piaculous* unto the Romans to pare their nails upon the nundinæ, observed every ninth day. *Browne.*

PIA MATER, Latin. A thin and delicate membrane, which lies under the dura mater, and covers immediately the substance of the brain. See ANATOMY, Index.

PIANISSIMO, in music, very soft.

PIANKASHAWS, a nation of North American Indians, who resided formerly in the North Western Territory, on the banks of the Wabash.

PIANO, Italian, in music, softly.

PIANO-FORTE, Italian. A pleasing stringed and keyed instrument of English origin, being invented by our poet Mason, the author of Caractacus: it received its name from its varied command, within certain limits, both of softness and strength. The chief beauty of this instrument, and which indeed constitutes its principal advantage over the harpsichord, is its capacity of obeying the touch, so as to enable the performer to vary and accommodate the expression to all those delicacies, energies, and striking lights and shades which so greatly characterise the more refined compositions of modern times. The piano-forte, though of recent invention, has received from the hands both of Englishmen and foreigners many useful and valuable improvements; and in that state in which it assumes the name of grand piano-forte, and is furnished with its additional keys, is not only qualified to give brilliancy of effect to sonatas, concertos, and all pieces of extraordinary execution, but forms an expressive accompaniment to the voice, and is one of the noblest and most elegant instruments in the whole compass of musical practice.

PIAR, a recent black general of the independents of Venezuela, Colombia. When Bolivar, on his landing at Ocumare, marched on Caraccas, he confided to Piar a body of infantry, and, when the former was repulsed, Piar managed to retreat with great skill, and afterwards beat the enemy several times. He was the idol of the soldiers, until he aspired to the supreme rank. To arrive at this it was necessary to sacrifice the whites and Bolivar. His scheme was, however, happily discovered, and, being arrested, he was tried by a court martial, and sentenced to be shot. Bolivar made some vain efforts to save him, but was obliged to sign his death warrant. He fell with bravery, pierced with seven balls, at the gates of Angustura. His projects were soon forgotten, but his military feats are still celebrated by the Colombians.

PIAS, or BIAS, a town of Asiatic Turkey, on the site of the ancient Issus. It was not many years ago a warlike and populous town, the residence of a chief, who rebelled against the grand seignior, and laid the neighbouring districts under contribution, till the Porte, irritated by his depredations, fitted out an expedition, which took this place and reduced it to ruins.

PIASTUS, or PIAST, a native of Poland, the son of Cossisco, or Kossiusko, a citizen of Cruswitz, who, from the station of a wheelwright, was raised to the throne of the duchy or kingdom of Poland, about A. D. 830, on the death of Popiel II. Different fabulous legends are told by the canon of Cracow, Guagnini, and other historians of that age, of the cause of this promotion; such as that, in the midst of a famine, he had entertained two angels, or at least two pilgrims, very hospitably; who, in return, enabled him miraculously to supply the wants of the people; from all which we may gather that Piast had become popular by his liberality in a time of scarcity. All historians agree that he governed with so much justice and clemency that the Poles had no reason to regret their choice. He died at Gnesna, whither he had removed the court from Cruswitz, and was succeeded by his son, Ziemovitus.

PIAZ'ZA, *n. s.* Ital. *piazza*. A walk under a roof supported by pillars.

He stood under the *piazza*.
Arb. and Pope's Scribl.

PIAZZA, a town of the interior of Sicily, in the Val di Noto, situated on the great road from Girgenti to Catania, about twenty miles from the south-west coast. Population 13,500. It is remarkable for nothing but the number of its churches and convents; but none of the buildings are worth notice.

PIAZZA, in architecture, popularly called piache, an Italian name for a portico, or covered

walk. The word literally signifies a broad open place or square; whence it also became applied to the walks or porticoes around them.

PIAZZA (Jerome Bartholomew), an Italian, originally a Roman Catholic, a Dominican friar, and a judge in the inquisition, but, turning Protestant, he came to England, and taught Italian and French at Cambridge. He published An Account of the Inquisition and its Proceedings, as practised in Italy: with an Extract out of an Authentic Book of the Roman Legends: Lond. 1722. He married a French Protestant, by whom he had three children; and died at Cambridge in 1745, with a good character.

PIBROCH, says Dr. Beattie, is a species of tune peculiar to the Highlands and Western Isles of Scotland. It is performed on a bagpipe, and differs totally from all other music. Its rhyme is so irregular, and its notes, especially in the quick movement, so mixed and huddled together, that a stranger finds it almost impossible to reconcile his ear to it, so as to perceive its modulation. Some of these pibrochs, being intended to represent a battle, begin with a grave motion resembling a march, then gradually quicken into the onset; run off with noisy confusion and turbulent rapidity, to imitate the conflict and pursuit; then swell into a few flourishes of triumphant joy; and perhaps close with the wild and slow wailings of a funeral procession.

PIC DU MIDI, LE, one of the highest mountains on the French side of the Pyrenees. Its elevation is somewhat more than 9500 feet. Thirty miles south of Pau, and seventy-five from Fontarabia, on the Bay of Biscay.

PICA, or PYE, in ecclesiastical matters, had formerly the same sense as ordinal, meaning a table or directory pointing out the order in which the devotional services appointed for different occasions were to be performed. It is derived from Πι, a contraction of πιναξ, a table; or from litera pictata, a great or black letter at the beginning of a new order in the prayers. It was used in a similar sense by officers of civil courts, who called their catalogues, or indexes of things contained in the rolls of their courts, the pyes.

PICA, among printers, is a particular size of their types or letters, so called from having been first used in printing the pye or pica above-mentioned.

PICA, in medicine, a depravation of appetite, which makes the patient long for what is unfit for food, or incapable of nourishing; as chalk, ashes, coals, plaster, lime, &c. See MEDICINE, Index.

PICA, in ornithology. See CORVUS.

PICA MARINA, in ornithology. See ALCA and HÆMATOPUS.

PICÆ, pies, in ornithology, the second order of birds in the Linnæan system. They are thus characterised by Kerr:—'The bill is sharp and convex on its upper surface. The legs are short, strongish, and of different kinds, some climbers, and some fitted for walking, i. e. having no back toe. The body is firmly constructed. The birds of this order live on various kinds of food, and are mostly unfit for food. They pair, build their nests on trees, and the male feeds the female during incubation.'—Animal Kingdom, vol. I. p. 418. There are thirty genera.

PICARD (John), an able mathematician, one of the most learned astronomers of the seventeenth century, born at Fleche. He became priest and prior of Rillie, in Anjou. Going to Paris, he was, in 1666, appointed astronomer to the Academy of Sciences. In 1671 he was sent, by order of the king, to the castle of Uraniburg, built by Tycho Brahe in Denmark, to make astronomical observations there; and thence he brought the original MSS. written by Tycho Brahe. He made important discoveries in astronomy; and was the first who travelled through France to measure a degree of the meridian. His works are, 1. A Treatise on Levelling. 2. Fragments of Dioptrics. 3. Experimenta circa Aquas Effluentes. 4. De Mensuris. 5. De Mensura Liquidorum et Aridorum. 6. A Voyage to Uraniburg, or Astronomical Observations made in Denmark. 7. Astronomical Observations made in several parts of France, &c. These, and some other of his works, which are much esteemed, are in the Memoirs of the Academy of Sciences, vols. 6 and 7.

PICARDS, a religious sect which arose in Bohemia in the fifteenth century. Picard, the author of this sect, drew after him a number of men and women, pretending he would restore them to the primitive state of innocence wherein man was created; and accordingly he assumed the title of the New Adam. Under this pretence he indulged his followers in all kinds of impurity. He first published his opinions in Germany and the Netherlands, and persuaded his people to go naked. He seized on an island in the river Laulnecz, some leagues from Thabor, the head-quarters of Zisca, where he fixed himself and his followers. At length Zisca, general of the Hussites, marched against them, made himself master of their island, and put them all to death except two; whom he spared, that he might learn their doctrine. Such is the account which various writers, relying on the authorities of Æneas Sylvius and Varillas, have given of the Picards, who appear to have been a party of the Vaudois, that fled from persecution in their own country, and sought refuge in Bohemia. But it is highly probable that the whole is a calumny invented to disgrace the Picards, because they deserted the communion of the church of Rome. Lasitius informs us that Picard, with forty other persons, besides women and children, settled in Bohemia in 1418. Balbinus the Jesuit, in his Epitome Rerum Bohemicarum, lib. ii. gives a similar account, and charges on the Picards none of the crimes ascribed to them by Sylvius. Schlecta, secretary of Ladislaus, king of Bohemia, in his letters to Erasmus, gives a particular account of the Picards, wherein he represents their principles as no other than those of the Vaudois; and M. de Beausobre has shown that they were both of the same sect, though under different denominations.

PICARDY, a former province of France, bounded on the north by Hainault, Artois, and the Straits of Calais; on the east by Champagne; on the south by the Isle of France; and on the west by Normandy and the English Channel.

The name is not more ancient than the twelfth century. It has been compared in form to a bent arm; and in this figure is nearly 150 miles long, but not above forty broad, and in many places not above twenty. It is generally level, and produces wine, fruit of all kinds, plenty of corn, and great quantities of hay; but, wood being scarce, most of the inhabitants burn turf. They have, however, some pit coal. It was united to the crown of France in the year 1643. Its principal rivers are the Somme, Oise, Canche, Scarpe, Lys, Aa, Scrape, and Deule. Since 1790 it has formed the department of the Somme, and part of those of the Aisne, and the Straits of Calais. Amiens is the capital.

PICAROON', *n. s.* Span. *picaron;* It. *picare.* A robber; a plunderer.

Corsica and Majorca in all wars have been the nests of *picaroons.* *Temple's Miscellanies.*

PICART (Bernard) an engraver, son of Stephen Picart, also a famous engraver, was born at Paris in 1673. He learned the elements of his art from his father, and studied architecture and perspective under Sebastian le Clerc. As he embraced the reformed religion, he settled in Holland, where his genius produced those master-pieces which made him esteemed the most ingenious artist of his age. A multitude of books are embellished with plates of his engraving. He died in 1733.

PICCAGE, in law (piggagium, from the Fr. piquer, i. e. effodere), a consideration, paid for the breaking up of ground to set up booths, stalls, or standings, in fairs; payable to the lord of the soil.

PICCOLOMINI (Alexander), archbishop of Patras, was born at Sienna, about 1508, of an illustrious and ancient family, originally from Rome. He composed for the theatre, and was equally distinguished for genius and virtue. His charity was very great, and was much exerted in favor of men of letters. He wrote many works in Italian. The principal are, 1. Various Dramatic Pieces. 2. A Treatise on the Sphere. 3. A Theory of the Planets. 4. A Translation of Aristotle's Art of Rhetoric and Poetry, in 4to. 5. A System of Morality; Venice 1575, in 4to.; translated into French by Peter de Larivey, in 4to.; Paris, 1581. He was the first who wrote in the Italian language upon philosophical subjects. He died at Sienna, the 12th of March, 1578, aged seventy.

Piccolomini (Francis), of the same family, was born in 1520, and taught philosophy with success for twenty-two years in the most celebrated universities of Italy, and afterwards retired to Sienna, where he died in 1604, aged eighty-four. His works are, 1. Commentaries upon Aristotle; Mentz, 1608, 4to. 2 Universa Philosophia de Moribus; Venice, 1583, folio. He labored to revive the doctrine of Plato, and imitated his manners. He had for his rival the famous James Zabarella, whom he excelled in facility of expression and elegance of language; but to whom he was much inferior in point of argument.

Piccolomini (James), whose proper name was Ammanati, took that of Piccolomini, in honor of his patron Pius II. He was born near Lucca, in 1422. He became bishop of Massa, afterwards of Frescati; a cardinal in 1461, under the title of de Pavie; and died in 1479, aged fifty-seven, of an indigestion of figs. He left 8000 pistoles in the banker's hands, which pope Sixtus IV. claimed, and of which he gave a great part to the hospital of the Holy Ghost. His works, which consist of some Letters, and a History of his own Time, were printed at Milan, in 1521, in folio. His history, entitled Commentaries, commences the 18th of June, 1464, and ends the 6th of December, 1469. They are a Sequel of Pope Pius II.'s Commentaries, which end with 1463.

Piccolomini (Octavius), of Arragon, duke of Amalfi, prince of the empire, an imperial general, and knight of the Golden Fleece, was born in 1599. He first bore arms among the Spanish troops in Italy. He afterwards served under Ferdinand II., who sent him to the relief of Bohemia, and gave him the command of the imperial troops in 1634. He signalised himself at the battle of Nortlingue, and made marshal de Chatillon raise the siege of St. Omer. He defeated the marquis Fenquieres in 1639; nor did the loss of the battle of Wolfenbuttel, in 1651, impair his glory. He died on the 10th of August, 1656, aged fifty-seven, with the character of an active general. The celebrated Caprara was his nephew.

PICENI, or Picentes, the ancient inhabitants of Picenum (Cicero, Livy), who were originally a colony of Sabines. They were different from the Picentini, on the Tuscan Sea, though called so by the Greeks; but Ptolemy calls them Piceni, as does also Pliny. Their territory at this day is supposed to form the greatest part of the march of Ancona. Cluverius.

PICENTIA, the capital of the Picentini, who inhabited the Ager Picentinus (Strabo, Pliny).

PICENTINI, an ancient people of Italy, who inhabited the Ager Picentinus. The Greeks commonly confound the Picenti and Picentes, but the Romans distinguish them. The former had only two towns, named Silernum and Picentia; the situation of both uncertain; only Pliny says the latter stood within land, at some distance from the sea. Now thought to be Bicenza (Holstenius), in the Principato Citro of Naples.

PICENTINUS Ager, an ancient district of Italy, on the Tuscan Sea, extending from the Promontorium Minervæ, the southern boundary of Campania on the coast, to the Silarus, the northern boundary of Lucania, reaching within land as far as the Samnites and Hirpini.

PICENTIUM Ager, Picenum, or Picenus Ager, a territory of Italy, lying to the east of Umbria, from the Appennine to the Adriatic; on the coast, extending from the river Aesis on the north, as far as the Prætutiani to the south. In the upper or northern part of their territory, the Umbri excluded them from the Appennine, as far as Camerinum; but in the lower or southern part they extended from the Adriatic to the Appennine. It was very fertile, and very populous. Cæs. Plin. Florus, Cic. Call. Liv. Tac. Varro.

PICHEGRU (Charles), a French revolutionary general, born in 1761, at Arbois in Franche-

compté, of mean parentage. He received a good education under the monks of his native town; after which he entered into the army, and became a serjeant. In the revolution he rose to the rank of general, and in 1793 gained a victory over the allied armies at Hagenau; in consequence of which he succeeded to the command of the army of the north. His celebrated exploit was the subjugation of Holland, for which he was elected a member of the national assembly. At length he fell under the suspicion of being a royalist, and was banished to Cayenne, whence he escaped to England. Engaging in the schemes of the emigrants against Buonaparte, he went to Paris early in 1804, and was soon arrested, and committed a prisoner to the Temple. Here he was found dead (having been strangled), on the 6th of April; but whether he died by his own hand, or by that of an assassin, employed by the party in power, is a question which has been frequently and warmly agitated.

PICHINCHA, a mountain of Peru in Quito, in the province of Truxillo, estimated at 2432 toises above the level of the sea. It is, however, 1278 yards lower than the perpendicular height of Cotopaxi, and was formerly a volcano, but the crater on one of its sides is covered with sand and calcined matter; so that at present neither smoke nor fire issue from it. When Don George Juan and Antonio de Ulloa were stationed on it for the purpose of making astronomical observations, they found the cold on the top of this mountain extremely intense, the wind violent, and they were frequently involved in so thick a fog or cloud that an object at six or eight paces distance was scarcely discernible. The air grew clear, by the clouds moving nearer to the earth, and on all sides surrounding the mountain, to a vast distance, representing the sea with the mountain standing like an island in the centre. When that happened, they heard the dreadful noise of the tempests that discharged themselves on Quito and the neighbouring country. They saw the lightning issuing from the clouds, and heard the thunder roll far beneath them. While the lower parts were involved in tempests of thunder and rain, they enjoyed a delightful serenity; the wind was abated, the sky clear, and the enlivening rays of the sun moderated the severity of the cold. But, when the clouds rose, their thickness rendered respiration difficult: snow and hail fell continually, and the wind returned with all its violence; so that it was impossible entirely to overcome the fear of being, together with their hut, blown down the precipice on whose edge it was built, or of being buried in it by the constant accumulation of ice and snow. Their fears were likewise increased by the fall of enormous fragments of rocks. Though the smallest crevice visible in their hut was stopped, the wind was so piercing that it penetrated through; and though the hut was small, crowded with inhabitants, and had several lamps constantly burning, the cold was so great that each individual was obliged to have a chafing dish of coals, and several men were constantly employed every morning to remove the snow which fell in the night. By the severities of such a climate, their feet were swelled, and so tender that walking was attended with extreme pain, their hands covered with chilblains, and their lips so swelled and chopped that every motion in speaking drew blood.

'I was twice at the mouth of the crater of Pichincha,' says Humboldt, 'the mountain that overlooks the city of Quito. I know of no one but Condamine that ever reached it before; and he was without instruments, and could not stay above a quarter of an hour, on account of the extreme cold. I was more successful. From the edge of the crater rise three peaks, which are free from snow, as it is continually melted by the ascending vapor. At the summit of one of these I found a rock, that projected over the precipice, and hence I made my observations. This rock was about twelve feet long, by six broad, and strongly agitated by the frequent shocks, of which we counted eighteen in less than half an hour. We lay on our bellies, the better to examine the bottom of the crater. The mouth of the volcano forms a circular hole, nearly a league in circumference, the perpendicular edges of which are covered with snow on the top. The inside is of a deep black; but the abyss is so vast that the summits of several mountains may be distinguished in it. Their tops seemed to be 600 yards below us; judge then where their bases must be. I have no doubt that the bottom of the crater is on a level with the city of Quito. Condamine found it extinct, and even covered with snow; but we had to report the unpleasant news that it was burning. On my second visit, being better furnished with instruments, I found the diameter of the crater to be 1600 yards, whereas that of Vesuvius is but 670. The height of the mountain is 5280 yards.

PICK, *v. a.*, *v. n.* & *n. s.* } Saxon pæcan; Belg. and Teut.
PICK'ER, *n. s.* }
PICK'THANK, *n. s.* } *picken.* To cull; choose; select; gather here and there; glean. It has commonly *out* after it when it implies selection, and *up* when it means casual occurrence: as a verb neuter to eat or perform any thing slowly: a picker is one who picks or culls: a pickthank, an officious fellow; a parasite.

The want of many things fed him with hope, that he should out of these his enemies distresses *pick* some fit occasion of advantage.
Knolles's History.

This fellow *picks up* wit as pigeons peas.
Shakspeare.

He hath *picked out* an act,
Under whose heavy sense your brother's life
Falls into forfeit. *Id. Measure for Measure.*

Trust me, sweet,
Out of this silence yet I *picked* a welcome;
And, in the modesty of fearful duty,
I read as much as from the rattling tongue
Of saucy and audacious eloquence. *Shakspeare.*

You owe me money, Sir John, and now you *pick* a quarrel to beguile me of it. *Id. Henry IV.*

Many tales devised,
Oft the ear of greatness needs must hear,
By smiling *pickthanks* and base newsmongers.
Shakspeare.

It hath been noted by the ancients that it is dangerous to *pick* one's ears while he yawneth; for that, in yawning, the minor parchment of the ear is extended by the drawing of the breath. *Bacon.*

It was believed that Perkin's escape was not without the king's privity, who had him all the time of his flight in a line; and that the king did this to *pick* a quarrel to put him to death. *Id.*

Contempt putteth an edge upon anger more than the hurt itself; and, when men are ingenious in *picking out* circumstances of contempt, they do kindle their anger much. *Id.*

With pleasing tales his lord's vain ears he fed,
A flatterer, a *pickthank*, and a lyar. *Fairfax.*

It were a wonder, if, after the death of a prince, there should want some *pickthank*, to insinuate himself into his successor. *Bp. Hall.*

They must *pick* me *out* with shackles tired,
To make them sport with blind activity. *Milton.*

What made thee *pick* and chuse her *out*,
To employ their sorceries about? *Hudibras.*

Hope is a pleasant premeditation of enjoyment; as when a dog expects, till his master has done *picking* a bone. *More.*

A painter would not be much commended who should *pick out* this cavern from the whole Æneids; he had better leave them in their obscurity. *Dryden.*

Imitate the bees, who *pick* from every flower that which they find most proper to make honey. *Id.*

Why standest thou *picking*? is thy palate sore,
That bete and radishes will make thee roar? *Id.*

He was too warm on *picking* work to dwell,
But faggoted his notions as they fell,
And, if they rhym'd and rattled, all was well. *Id.*

How many examples have we seen of men that have been *picked up* and relieved out of starving necessities, afterwards conspire against their patrons! *L'Estrange.*

If he would compound for half, it should go hard but he'd make a shift to *pick* it *up*. *Id.*

They are as peevish company to themselves as to their neighbours; for there's not one circumstance in nature, but they shall find matters to *pick* a quarrel at. *Id.*

The business of a *pickthank* is the basest of offices. *Id.*

He that is nourished by the acorns he *picked up* under an oak in the wood, has appropriated them to himself. *Locke.*

The *pickers pick* the hops into the hair-cloth. *Mortimer.*

If he be great and powerful, spies and *pickthanks* generally provoke him to persecute and tyrannise over the innocent and the just. *South.*

He asked his friends about him, where they had *picked up* such a blockhead. *Addison's Spectator.*

He *picks* and culls his thoughts for conversation, by suppressing some, and communicating others. *Addison.*

Deep through a miry lane she *picked* her way,
Above her angle rose the chalky clay. *Gay.*

The will may *pick* and chuse among these objects, but it cannot create any to work on. *Cheyne.*

Heaven when it strives to polish all it can,
Its last, best work, but forms a softer man,
Picks from each sex, to make the fav'rite blest,
Your love of pleasure, our desire of rest. *Pope.*

Thus much he may be able to *pick out*, and willing to transfer into his new history; but the rest of your character will probably be dropped on account of the antiquated stile they are delivered in. *Swift.*

You are not to wash your hands, till you have *picked* your sallad. *Id.*

Pick the very refuse of those harvest fields. *Thomson.*

She has educated several poor children, that were *picked up* in the streets, and put them in a way of honest employment. *Law.*

PICK, *v. a.* & *n. s.*, PICK'ED, *adj.*, PICK'AXE, *n. s.*, PICK'LOCK, PICK'POCKET, PICK'PURSE, PICK'TOOTH. Sax. pycan; Teut. *pikken;* Fr. *piquer;* Span. *picar.* To prick; pierce; peck; rob; strike with a sharp or pointed instrument: as a noun substantive, a sharp pointed tool: picked is sharp; pointed; smart: a pick-axe, an axe made to pierce or pick rather than to cut: a picklock, an instrument which penetrates and opens a lock without the key: pickpocket and pickpurse are names for the thief who steals from the pocket or purse by thrusting his hand privately into the former: picktooth, an instrument for cleansing the teeth.

The eye that mocketh at his father, the ravens of the valley shall *pick out*. *Proverbs* xxx. 17.

We take him to be a thief too, Sir; for we have found upon him, Sir, a strange *picklock*. *Shakspeare.*

I think he is not a *pickpurse* nor a horse stealer. *Id.*

I'll hide my master from the flies, as deep
As these poor *pickaxes* can dig. *Id. Cymbeline.*

The other night I fell asleep here, and had my pocket *pickt*; this house is turned bawdy-house, they *pick* pockets. *Shakspeare.*

Pick an apple with a pin full of holes not deep, and smear it with spirits, to see if the virtual heat of the strong waters will not mature it. *Bacon.*

Their tools are a *pickaxe* of iron, seventeen inches long, sharpened at the one end to peck, and flat-headed at the other to drive iron wedges. *Carew.*

In answering of a book, 'tis best to be short, otherwise he that I write against will suspect that I intend to weary him, not to satisfy him. Besides, in being long, I shall give my adversary a huge advantage; somewhere or other he will *pick* a hole. *Selden.*

As when bands
Of pioneers, with spade and *pickaxe* armed,
Forerun the royal camp, to trench a field. *Milton.*

Scipio, having such a *picklock*, would spend so many years in battering the gates of Carthage. *Browne.*

It corrupts faith and justice, and is the very *picklock* that opens the way into all cabinets. *L'Estrange.*

Let the stake be made *picked* at the top, that the jay may not settle on it. *Mortimer's Husbandry.*

With an iron *picker* clear the earth out of the hills. *Mortimer.*

Did you ever find
That any art could *pick* the lock, or power
Could force it open. *Denham.*

What the miners call chert and whern, the stone-cutters nicomia, is so hard that the *picks* will not touch it; it will not split but irregularly. *Woodward.*

Thou raisedst thy voice to describe the powerful Betty or the artful *picklock*, or Vulcan sweating at his forge, and stamping the queen's image on viler metals. *Arbuthnot.*

It is reasonable, when Esquire South is losing his money to sharpers and *pickpockets*, I should lay out the fruits of my honest industry in a law suit. *Arbuthnot's History of John Bull.*

In the face, a wart or fiery pustule, heated by scratching or *picking* with nails, will terminate corrosive. *Wiseman.*

Pickpockets and highwaymen observe strict justice among themselves. *Bentley's Sermons.*

If a court or country's made a job,
Go drench a *pickpocket*, and join the mob. *Pope.*
His fellow *pickpurse*, watching for a job,
Fancies his fingers in the cully's fob. *Swift.*

If a gentleman leaves a *picktooth* case on the table after dinner, look upon it as part of your vails. *Id.*

PICK'APACK, *adj.* } From pack, by a re-
PICK'BACK, *adj.* } duplication very common in our language. In manner of a pack : on the back.

As our modern wits behold,
Mounted a *pickaback* on the old,
Much farther off. *Hudibras.*

In a hurry she whips up her darling under her arms, and carries the other a *pickapack* upon her shoulders. *L'Estrange.*

PICKAWAY, a county in the central part of Ohio. Chief town, Circleville. Pickaway plains extend several miles south of Circleville. They are a dead level; extremely fertile, without a single tree, and are regarded as a great curiosity. Here are many fine farms, and one pleasant town called Jefferson.

PICKAWAY, chief town of Pickaway county, Ohio, is three miles from Circleville.

PICKEER', *v. a.* Ital. *piccare.* To pillage; pirate; rob; make a flying skirmish.

No sooner could a hint appear,
But up he started to *pickeer*,
And made the stoutest yield to mercy,
When he engaged in controversy. *Hudibras.*

PICK'EREL-WEED, *n. s.* From pike. A water plant, from which pikes are fabled to be generated.

The luce or pike is the tyrant of the fresh waters; they are bred, some by generation, and some not; as of a weed called *pickerel-weed*, unless Gosner be mistaken. *Walton.*

PICKERING, a market-town in the North Riding of Yorkshire, twenty-seven miles north-east from York, nine from Malton, and 226 north by west from London. It is situate on a hill, in the mountainous district of Blackmore, and had formerly a very strong castle, the ruins only of which remain; the streets are irregularly built. Here the lord of the manor holds a court the second and third Monday after Easter, and the first and second Monday after Michaelmas. The church is a large building, and in the parish are several dissenting meeting-houses. Market on Monday. Fairs, Monday before February 13th; Monday before May 12th; September 25th; and the Monday before November 22nd, all for cattle.

PICKERY, in Scots law, petty theft, or stealing things of small value.

PICKET, an out-guard posted before an army, to give notice of an enemy approaching. 2. A punishment (for some time discontinued in the British army), in which a soldier stands with one foot upon a sharp-pointed stake; the time of his standing is limited according to the offence.

PICKETS, in fortification, stakes sharp at one end, and sometimes shod with iron, used in laying out the ground, about three feet long; but, when used for pinning the fascines of a battery, they are from three to five feet long.

PICKETS, in artillery, are about five or six feet long, shod with iron, to pin the park lines in laying out the boundaries of the park.

PICKETS, in the camp, are also stakes of about six or eight inches long, to fasten the tent cords, in pitching the tents; also, of about four or five feet long, driven into the ground near the tents of the horsemen, to tie their horses to.

PIC'KLE, *n. s.* & *v. a.* } Teut. *pickle*; Belg.
PIC'KLEHERRING. } *pekel.* Any kind of salt or pungent liquor, in which flesh or other substance is preserved; thing kept in pickle: hence perplexed condition or state; a word of contempt: pickle is to preserve in pickle; to season or imbue highly with any thing; as, a pickled rogue, i. e. one consummately villanous: a pickle-herring [pickle and herring] is a jackpudding; a merry-andrew; a buffoon.

Thou shalt be whipt with wire, and stewed in brine,
Smarting in lingering *pickle.* *Shakspeare.*
How cam'st thou in this *pickle*? *Id.*

Some fish are gutted, split, and kept in *pickle*; as whiting and mackerel. *Carew's Survey of Cornwall.*

Autumnal cornels next in order served,
In lees of wine, well *pickled* and preserved. *Dryden.*

They shall have all, rather than make a war,
The straits, the Guiney-trade, the herrings too;
Nay, to keep friendship, they shall *pickle* you. *Id.*

A physician undertakes a woman with sore eyes; his way was to dawb 'em with ointments, and while she was in that *pickle* carry off a spoon. *L'Estrange.*

Another branch of pretenders to this art, without horse or *pickleherring*, lie snug in a garret. *Spectator.*

He instructs his friends that dine with him in the best *pickle* for a walnut. *Addison's Spectator.*

The *pickleherring* found the way to shake him, for, upon his whistling a country-jig, this unlucky wag danced to it with such a variety of grimaces, that the countryman could not forbear smiling, and lost the prize. *Id.*

A third sort of antiscorbuticks are called astringent; as capers, and most of the common *pickles*, prepared with vinegar. *Arbuthnot.*

Poor Umbra, left in this abandoned *pickle*,
E'en sits him down. *Swift's Miscellanies.*

PICO, an island near the coast of Africa, one of the Azores. It consists almost entirely of a mountain rising to the height of 7000 feet, and crowned with a magnificent dome; its sides are covered with vineyards, and produce considerable quantities of a fine wood in great request for furniture at Lisbon. The great wealth of Pico consists in its wine, of which it yields annually about 5000 pipes. The British commissaries of the West India colonies keep an agent at Fayal, who contracts for the principal portion of each vintage. The wine is of the color and flavor of inferior Madeira, and is held in great repute by our army and navy. The inhabitants of the Peak live chiefly in detached houses. There is a town called Lagena, chiefly for the accommodation of the monks; but no harbour, or any other anchorage that can accommodate large vessels. Pico can thus carry on trade only through the medium of Fayal, a neighbouring island.

PICQUET, a celebrated game at cards played between two persons, with only thirty-two cards; all the deuces, threes, fours, fives, and sixes, being set aside.

In playing at this game twelve cards are dealt

to each, and the rest laid on the table; when, if one of the gamesters find he has not a court card in his hand, he is to declare that he has carte blanche, and tell how many cards he will lay out, and desire the other to discard, that he may show his game, and satisfy his antagonist that the carte blanche is real, for which he reckons ten. And here the eldest hand may take in three, four, or five, discarding as many of his own for them, after which the other may take in all the remainder if he pleases. After discarding, the eldest hand examines what suit he has most cards of; and, reckoning how many points he has in that suit, if the other has not so many in that, or any other suit, he reckons one for every ten in that suit, and he who thus reckons most is said to win the point. It is to be observed that, in thus reckoning the cards, every card goes for the number it bears; as a ten for ten; only all court cards go for ten, and the ace for eleven, and the usual game is 100 up. The point being over, each examines what sequences he has of the same suit, viz. how many tierces, or sequences of three cards; quartes, or sequences of four cards; quintes, or sequences of five cards, &c., he has. These several sequences are distinguished in dignity by the cards they begin from: thus ace, king, and queen, are styled tierce major; king, queen, and knave, tierce to a king; knave, ten, nine, tierce to a knave; and the best tierce, quarte, or quinte, prevails, so as to make all the others in that hand good, and to destroy all those in the other hand. In like manner a quarte in one hand sets aside a tierce in the other.

The sequences over, the antagonists proceed to examine how many aces, kings, queens, knaves, and tens each holds; reckoning for every three of any sort, three; but here too, as in sequences, he that with the same number of threes or fours has one that is higher than any the other has, makes his own good, and sets aside all his adversary's; but four of any sort, which is called a quatorze, because fourteen are reckoned for it, always set aside three.

The game in hand being thus reckoned, the eldest proceeds to play, reckoning one for every card he plays above nine, while the other follows him in the suit: but unless a card be won by one above nine, except it be the last trick, nothing is reckoned for it. The cards being played out, he that has most tricks reckons ten for winning the cards, but if they have tricks alike, neither reckons any thing. If one of them wins half the tricks, instead of ten, which is his right for winning the cards, he reckons forty, and this is called capot.

This deal being finished, each person sets up nis game; they then proceed to deal again as before; cutting afresh each time for the deal: if both parties are within a few poiuts of being up, the carte blanche is the first that reckons, then the point, then the sequences, then the quatorzes, then the tierces, and then the tenth cards. He that can reckon thirty in hand by carte blanche, points, quintes, &c., without playing, before the other has reckoned any thing, reckons ninety for them, and this is called a repike; and, if he reckons above thirty, he reckons so many above ninety. If he can make up thirty, part in hand, and part in play, before the other has told any thing, he reckons for them sixty; and this is called a repike; and if he reckons above thirty, he reckons so many above ninety. If he can make up thirty, part in hand, and part in play, before the other has told any thing, he reckons for them sixty; and this is called a pique, whence the name of the game. M. de Moivre, in his doctrine of chances, has resolved among others, the following problems:—1. To find, at picquet, the probability which the dealer has for taking one ace or more in three cards, he having none in his hands. He concludes from his computation that it is 29 to 28 that the dealer takes one ace or more. 2. To find at picquet the probability which the eldest has of taking an ace or more in five cards, he having no ace in his hand. Answer, 232 to 91, or 5 to 2, nearly. 3. To find at picquet the probability which the eldest has of taking both an ace and a king in five cards, he having none in his hand. Answer, the odds against the eldest hand taking an ace and a king are 331 to 315, or 21 to 20, nearly. 4. To find at picquet the probability of having twelve cards dealt to, without king, queen, or knave; which case is commonly called cartes blanches. Answer, the odds against cartes blanches are 1791 to 1 nearly. 5. To find how many different sets, essentially different from one another, one may have at picquet before taking in. Answer 28,967,278. This number falls short of the sum of all the distinct combinations, whereby twelve cards may be taken out of thirty-two, this number 225,792,840; but it ought to be considered that in that number several sets of the same import, but differing in suit, might be taken, which would not introduce an essential difference among the sets.

The technical terms used in picquet are as follows:—

Capot is when either of the players makes every trick for which he scores forty.

Cards signify the majority of tricks, which reckon for ten points.

Carte Blanche means a hand without a court card in the twelve dealt, which counts for ten, and takes place of every thing else.

Huitième, eight successive cards of the same suit, counts eighteen points.

Pique is when the elder hand has reckoned thirty in hand, and play before the adversary has gained one; in which case, instead of thirty, it is called sixty, adding thereto as many points as are obtained above thirty.

Point, the greatest number on the cards of the same suit in hand, after having taken in, reckoned by their pips, scores for as many points as cards.

Quart, four cards in sequence of the same suit, counts four points: there are five kinds of quarts, the first called quart-major, consists of ace, king, queen, and knave; the second, quart from a king, of king, queen, knave, and ten; the third, quart from a queen, of queen, knave, ten, nine; the fourth, quart from a knave, of knave, ten, nine, eight; the fifth, a basse-quart or quart-minor, of ten, nine, eight, and seven.

Quatorze, the four aces, kings, queens, knaves, or tens, scores fourteen points.

Quint means five cards of the same suit in sequence, and reckons fifteen points: there are

four sorts of quints; a quint-major of ace king, queen, knave, and ten, down to knave, ten, nine, eight, and seven, styled a quint-minor.

Repique signifies when one of the players counts thirty or more in hand, before the adversary obtains one, then it is called ninety, reckoning as many points above ninety as were gained above thirty.

Sixiéme, or six cards of the same suit in sequence, reckons for sixteen points: there are three sorts of sixiémes, viz. sixiéme-major from the ace, sixiéme from the king, and sixiéme minor from the queen.

Septiéme, or seven of the same suit in sequence, counts for seventeen points; there are two septiémes, one from the ace, the other from the king.

Threes of aces, &c. down to tens, reckon three points.

Talon or Stock means the eight remaining cards after twelve are dealt to each player.

Tierce, or sequence of three, reckons for three: there are six kinds of tierces, tierce-major, of ace, king, queen; down to nine, eight, seven, styled tierce-minor.

For the mode of playing the general game, see Hoyle.

PICRA, a lake of Africa, which Alexander the Great crossed, when he went to consult the oracle of Jupiter Ammon.—Diod.

PICRAMNIA, in botany, a genus of the pentandria order, and diœcia class of plants; natural order doubtful: CAL. tripartite: COR. three petals; the stamina from three to five, awl-shaped, and seem to join together at the base: STYLI two, which are short and bent backwards: BERRY roundish, and contains two oblong seeds, and sometimes one seed only. There is only one species, viz.

P. antidesma, the murjoe bush. This shrub is frequent in copses and about the skirts of woods in Jamaica, rising about eight or nine feet from the ground. The leaves are oval, pointed, and placed alternately along the branches; the flower-spikes are long, pendulous, and slender; the florets small and white; the berries are numerous, at first red, then of a jet black color; the pulp is soft, and of a purple complexion. The whole plant is bitter, and especially the berry. The negroes make a decoction of them, and use it in weaknesses of the stomach, and in venereal cases.

PICRANIA, in botany, a genus of plants, of the class pentandria, and order monogynia. The species known is P. amara, or bitter wood, a tall and beautiful timber tree, common in the woods of Jamaica. The name is expressive of its sensible qualities. Every part of it is intensely bitter; and, even after the tree has been laid for floors many years, whoever rubs or scrapes the wood feels a great degree of bitterness in their mouth or throat. Cabinet-work made of this wood is very useful, as no insect will live near it. This tree has a great affinity to the quassia amara of Linnæus; in lieu of which it is used as an antiseptic in putrid fevers. When used, less of it will do than of the quassia amara of Surinam. See QUASSIA.

PICRIS, in botany, ox-tongue; a genus of the polygamia æqualis order, and syngenesia class of plants; natural order forty-ninth, compositæ. There are four species, of which the only remarkable one is the P. echioides, the common ox-tongue, growing spontaneously in corn-fields in Britain. It has undivided leaves embracing the stem, with yellow blossoms, which sometimes close soon after noon, at other times remain open till nine at night. It is an agreeable pot-herb while young. The juice is milky, but not too acrid.

PICRIUM, in botany, a genus of the monogynia order and tetrandria class of plants; natural order doubtful: CAL. monophyllous and quinquefid: COR. monopetalous, and its tube is short; the filaments are four, and hooded at their insertion; the stile long and thick, the stigma bilamellated: CAPS. round, bivalved, and contains a number of small seeds. There are two species, 1. P. ramosa, and 2. P. spicata; both natives of Guiana. Both species are bitter, and employed in dyspepsy, and to promote the menses; they are also recommended in visceral obstructions.

PICROMEL, in chemistry and anatomy, the characteristic principle of bile. If sulphuric acid, diluted with five parts of water, be mixed with fresh bile, a yellow precipitate will fall. Heat the mixture, then leave it in repose, and decant off the clear part. What remains was formerly called resin of bile, but it is a greenish compound of sulphuric acid and picromel. Edulcorate it with water, and digest with carbonate of barytes. The picromel now liberated will dissolve in the water. On evaporating this solution, it is obtained in a solid state. Or by dissolving the green sulphate in alcohol, and digesting the solution over carbonate of potassa till it cease to redden litmus paper, we obtain the picromel combined with alcohol. It resembles inspissated bile. Its color is greenish-yellow; its taste is intensely bitter at first, with a succeeding impression of sweetness. It is not affected by infusion of galls, but the salts of iron and subacetate of lead precipitate it from its aqueous solution. It affords no ammonia by its destructive distillation. Hence the absence of azote is inferred, and the peculiarity of picromel.

PICROTOXIA, in chemistry, the bitter and poisonous principle of cocculus Indicus, the fruit of the menispermum cocculus. To the filtered decoction of these berries add acetate of lead, while any precipitate falls. Filter and evaporate the liquid cautiously to the consistence of an extract. Dissolve in alcohol of 0·817, and evaporate the solution to dryness. By repeating the solutions and evaporations, we at last obtain a substance equally soluble in water and alcohol. The coloring matter may be removed by agitating it with a little water. Crystals of pure picrotoxia now fall, which may be washed with a little alcohol. The crystals are four-sided prisms, of a white color, and intensely bitter taste. They are soluble in twenty-five times their weight of water, and are not precipitable by any known re-agent. Alcohol, specific gravity 0·810, dissolves one-third of its weight of picrotoxia. Pure sulphuric ether dissolves two-fifths of its weight.

Strong sulphuric acid dissolves it, but not when much diluted. Nitric acid converts it in-

to oxalic acid. It dissolves and neutralises in acetic acid, and falls when this is saturated with an alkali. It may therefore be regarded as a vegeto-alkali itself. Aqueous potassa dissolves it, without evolving any smell of ammonia. It acts as an intoxicating poison.

Sulphate of picrotoxia must be formed by dissolving picrotoxia in dilute sulphuric acid; for the strong acid chars and destroys it. The solution crystallises on cooling. The sulphate of picrotoxia dissolves in 120 times its weight of boiling water. The solution gradually lets fall the salt in fine silky filaments disposed in bundles, and possessed of great beauty. When dry it has a white color, and feels elastic under the teeth, like plumose alum. It is composed of

Sulphuric acid .	. 9·99	5
Picrotoxia .	. 90·01	45
	100·00	

Nitrate of picrotoxia.—Nitric acid of the specific gravity 1·38, diluted with twice its weight of water, dissolves, when assisted by heat, the fourth of its weight of picrotoxia. When this solution is evaporated to one-half it becomes viscid, and on cooling is converted into a transparent mass, similar to a solution of gum arabic. In this state the nitrate of picrotoxia is acid, and exceedingly bitter. If it be still further dried, in a temperature not exceeding 140°, it swells up, becomes opaque, and grows at last perfectly white and light, like calcined alum. If we keep it in this state, at a temperature below that of boiling water, adding a little water occasionally, the whole excess of acid exhales, and the taste becomes purely bitter. When this salt is washed in pure water, the acid is totally removed, and the picrotoxia is separated in the state of fine white plates. See Chemistry.

Muriate of picrotoxia.—Muriatic acid, of the specific gravity 1·145, has little action on picrotoxia. It dissolves it when assisted by heat, but does not become entirely saturated. Five parts of this acid, diluted with three times its weight of water, dissolve about one part of picrotoxia at a strong boiling temperature. The liquor, on cooling, is converted into a grayish crystalline mass, composed of confused crystals. When these crystals are well washed, they are almost destitute of taste, and feel elastic under the teeth. They dissolve in about 400 times their weight of boiling water, but are almost entirely deposited on cooling. The solubility is much increased by the presence of an excess of acid.

Acetate of picrotoxia.—Acetic acid dissolves picrotoxia very well, and may be nearly saturated with it by the assistance of a boiling heat. On cooling, the acetate precipitates in well-defined prismatic needles. This acetate is soluble in fifty times its weight of boiling water. On cooling, it forms crystals of great beauty, light, without any acid smell, and much less bitter than picrotoxia itself. It is decomposed by nitric acid, which disengages the acetic acid. Dilute sulphuric acid has no marked action on it. It is not so poisonous as pure picrotoxia.—Boullay. Ann. de Chimie.

PICTAVIA, an ancient kingdom of Caledonia or Scotland, comprehending, at its most flourishing period, all the territories bounded on the north by the Forth and Clyde, and on the south by the Tweed and Solway. It was inhabited by the Picts. See Picts.

PICTAVIUM, an ancient town of Gaul, the capital of the Pictones, called also Lemnum, now Poictiers.

PICTET (Benedict), a native of Geneva, born in 1655, of a distinguished family. After having travelled into Holland and England, he taught theology in his own country with great reputation. The university of Leyden, after the death of Spantreina, invited him to fill his place; but he preferred his own country, for which he received the thanks of the council. He died 9th of June, 1724, aged sixty-nine. He published a great number of works in Latin and French, which are much esteemed in Protestant countries. The principal of these are, 1. A System of Christian Theology in Latin, 3 vols. in 4to., best edition, 1721. 2. Christian Morality, Geneva, 1710, 8 vols. 12mo. 3. The History of the Eleventh and Twelfth centuries; a sequel to that of Sueur, 1713, 2 vols. 4to., and held in higher estimation. 4. Several Controversial Treatises. 5. A great number of tracts on morality and piety; particularly the Art of Living and Dying well; Geneva, 1705, 12mo. 6. Letters. 7. Sermons, from 1697 to 1721; 4 vols 8vo.

Pictet (John Lewis), a counsellor of Geneva, born in 1739, of the same family. He was member of the Council of Two Hundred; counsellor of state and Syndic, and died in 1781. He studied astronomy, and made several voyages into France and England. He left in MS. the Journal of a voyage which he made to Russia and Siberia in 1768 and 1769, in order to observe the transit of Venus over the sun's disk.

PICTI, or Pictæ, Lat. painted, an ancient people of Scythia, so named, because they painted their bodies with various colors, to make them appear terrible to their enemies. They are also called Agathyrsi. According to Servius, a colony of them emigrated to the north parts of Britain, where they settled, and preserved their name and manners, and gave rise to the kingdom of the Picts. But this is disputed. See Picts.

PICTONES, an ancient people of Gaul, mentioned by Cæsar (De Bell. Gall. vii. c. 4), who inhabited the country called Poictou in modern times, till the late revolution in France.

PICTONIUS, from the Pictones, who were subject to this disease, in medicine, applied to a species of colic. It should rather be called colica pictorum, the painter's cholic, because, from their use of lead, they are much afflicted with it.

PICTS, one of those nations who anciently possessed the north of Britain. It is generally believed that they were so called from their custom of painting their bodies; an opinion which Camden supports with great erudition. See Gough's edition, Vol I. p. xci. of the preface. It is certainly liable, however, to considerable objections; for as this custom prevailed among the other ancient inhabitants of Britain, who used the glastum of Pliny and the vitrum of Mela for

that purpose, it may be asked, why the name of Picti was confined by the Romans to only one tribe, when it was equally applicable to many others? Why should they design them only by an epithet without ever annexing their proper name? Or why should they impose a new name on this people only, when they gave their proper name to every other tribe which they had occasion to speak of? As these questions cannot be answered in any satisfactory manner, we must look for some other derivation of the name. The Highlanders of Scotland, who speak the ancient language of Caledonia, express the name of this once famous nation by the term pictich, meaning pilferers or plunderers. The appellation was probably imposed upon this people by their neighbours, or assumed by themselves, some time after the reign of Caracalla, when the unguarded state of the Roman province, on which they bordered, gave them frequent opportunities of making incursions thither, and committing depredations. Accordingly this name seems to have been unknown till the end of the third century. Eumenius, the panegyrist, is the first Roman author who mentions this people under their new name of Pictich, or, with a Latin termination, picti.

Concerning the origin of the Picts, authors are much divided. Boethius derives them from the Agathyrsi, Pomponius Lætus from the Germans, Bede from the Scythians, Camden and Father Innes from the ancient Britons, Stillingfleet from a people inhabiting the Cimbrica Chersonesus, and Keating and O'Flaherty, on the authority of the Psalter Cashel, derive them from the Thracians. But the most probable opinion is, that they were the descendants of the old Caledonians. Several reasons are urged in support of this opinion by Macpherson; and the words of Eumenes, 'Caledonum, aliorumque Pictorum, silvas,' &c., plainly imply that the Picts and Caledonians were one and the same people. As there has been much dispute about the origin of the Picts, so there has been likewise about their language. There are many reasons which make it plain that their tongue was the Gaelic or Celtic; and these reasons are a further confirmation of their having been of Caledonian extract. Through the east and north-east coasts of Scotland (which were possessed by the Picts) we meet with an innumerable list of names of places, rivers, mountains, &c., which are manifestly Gaelic. From a very old registry of the priory of St. Andrew's (Dalrymple's Collections, p. 122), it appears, that in the days of Hungus, the last Pictish king of that name, St. Andrew's was called Mucross; and that the town now called Queensferry had the name of Ardchinneachan. Both these words are Gaelic. The first signifies the heath or promontory of boars; and the latter the height or peninsula of Kenneth. In the list of Pictish kings published by father Innes most of the names are obviously Gaelic, and in many instances the same with the names in the list of Scottish or Caledonian kings published by the same author. Had Innes understood any thing of this language he would not have supposed with Camden that the Picts spoke the British tongue. The two words on which they build their conjecture (strath and aber), are as common in the Gaelic as they could have been in the British, and at this day make a part of the names of places in countries to which the Pictish empire never extended. The names of Strathfillan and Lochaber may serve as instances.

The Picts of the earliest ages, as appears from the joint testimony of all writers who have examined the subject, possessed only the east and north-east coast of Scotland. On one side the ancient Drumalbin, or that ridge of mountains reaching from Lochlomond near Dumbarton to the frith of Taine, which separates the county of Sutherland from a part of Ross, was the boundary of the Pictish dominions. Accordingly we find in the life of St. Columba that, in travelling to the palace of Brudeus, king of the Picts, he travelled over Drumalbin, the Dorsum Britanniæ of Adamnan. On the other side, the territory of the Picts was bounded by the Roman province. After Britain was relinquished by the emperor Honorius, they and the Saxons by turns were masters of those countries which lie between the frith of Edinburgh and the river Tweed. We learn from Bede that the Saxons were masters of Galloway when he finished his Ecclesiastical History. The Picts, however, made a conquest of that country soon after; so that, before the extinction of their monarchy, all the territories bounded on the one side by the Forth and Clyde and on the other by the Tweed and Solway fell into their hands. The history of the Picts, as well as of all the other ancient inhabitants of Britain, is extremely dark. The Irish historians give us a long list of Pictish kings, who reigned over Pictavia for eleven or thirteen centuries before the Christian era. After them Innes, in his Critical Essay, gives us a list of above fifty, of whom no fewer than five held the sceptre, each for a whole century. It is probable that these writers had confounded the history of the Picts with that of their ancestors the old Caledonians. In any other view their accounts of them are highly fabulous; and have been long ago confuted by Dr. Macpherson, of Slate. Adamnan, abbot of Ionia, is the first author who expressly mentions any Pictish king: and the oldest after him is Bede. We are informed by these two writers that St. Columba converted Brudeus, king of the Picts, to the Christian faith. Columba came into Britain A. D. 565. The history of Drust, or Drest, who is said to have reigned over the Picts in the beginning of the fifth century, when St. Ninian first preached the gospel to that nation, A. D. 630, has all the appearance of fiction. Bede informs us that, during the reign of the ancestors of Brudens, the Picts killed Egfred, king of Northumberland, in battle, and destroyed the greatest part of his army. The same author mentions another of their kings called Naitan, to whom Ceolfrid, abbot of Wiremouth, wrote his famous letter concerning Easter and the Tonsure; a letter in which Bede himself is supposed to have had a principal hand. Roger Hoveden and Simon of Durham mention two other Pictish kings, Onnust and Kinoth, the first of whom died in 761, and the latter flourished about 774, and gave an

asylum to Alfred of Northumberland, who was about that time expelled his kingdom. The accounts given by the Scottish historians of several other Pictish kings cannot be depended on; nor are the stories told by the British historians, Geoffroy of Monmouth and the author of the Eulogium Brittaniæ, worthy of greater credit. In the ninth century the Pictish nation was totally subdued by the Scots under Kenneth II. Since that time their name has been lost in that of the conquerors, with whom they were incorporated: however, they seem to have been treated by the Scottish kings with great lenity, so that for some ages after they commanded respect. The prior of Hogulstead, an old English historian, relates that they made a considerable figure in the army of David I., in his disputes with Stephen, king of England. In a battle fought in 1136, by the English on one side and the Scots and Picts on the other, the latter insisted on their hereditary right of leading the van of the Scots army, and were indulged in that request. The principal seat of the Pictish kings was at Abernethy. Brudeus, however, as appears from the accounts given by Adamnan, in his life of Columba, had a palace at Inverness. With respect to the manners and customs of the Picts, there is no reason to suppose they were any other than those of the old Caledonians and Scots, of which many particulars are related in the Roman writers. Upon the decline of the empire, cohorts of barbarians were raised, and Picts were invited into the service, by Honorius, when peace was every where restored, and were named Honoriaci. Those under Constantine opened the passes of the Pyrenean mountains, and let the barbarous nations into Spain. From this period we date the civilisation of their manners, which happened after they had by themselves, and then with the Scots, ravaged this Roman province.

PICTS' WALL, in antiquity, a wall begun by the emperor Adrian, on the northern bounds of England, to prevent the incursions of the Picts and Scots. It was first made only of turf, strengthened with palisadoes, till the emperor Severus, coming into Britain in person, built it with solid stone. This wall, part of which still remains, began at the entrance of the Solway Frith in Cumberland, and running north-east extended to the German Ocean. See ADRIAN and SEVERUS.

PICTURE, *n. s.* & *v. a.* } Lat. *pictura*. A
PICTO'RIAL, *adj.* } resemblance of persons or things, particularly in colors; the science of painting: to paint or represent: pictorial (only used by Browne) is, produced by a painter; or referring to painting.

All filled with these rueful spectacles of so many wretched carcases starving, that even I, that do but hear it from you, and d *picture* it in my mind, do greatly pity it. *Spenser.*

Madam, if that your heart be so obdurate,
Vouchsafe me yet your *picture* for my love,
The *picture* that is hanging in your chamber.
Shakspeare.

I have not seen him so *pictured*. *Id.*

Pictures and shapes are but secondary objects, and please or displease but in memory. *Bacon.*

Quintilian, when he saw any well-expressed image of grief either in *picture* or sculpture, would usually weep. *Wotton.*

He who caused the spring to be *pictured*, added this rhyme for an exposition.
Carew's Survey of Cornwall.

Sea horses are but grotesco delineations, which fill up empty spaces in maps, as many *pictorial* inventions, not any physical shapes. *Browne.*

It is not allowable, what is observable of Raphael Urban; wherein Mary Magdalen is *pictured* before our Saviour washing his feet on her knees, which will not consist with the strict letter of the text.
Browne's Vulgar Errours.

Your neighbours would not look on you as men,
But think the nations all turned *picts* again. *Lee.*

If nothing will satisfy him, but having it under my hand, that I had no design to ruin the company of *picture*-drawers, I do hereby give it him.
Stillingfleet.

His thoughts, which are the *pictures* and results of passions, are generally such as naturally arise from those disorderly motions of our spirits. *Dryden.*

Devouring what he saw so well designed,
He with an empty *picture* fed his mind. *Id.*

It suffices to the unity of any idea, that it be considered as one representation or *picture*, though made up of ever so many particulars. *Locke.*

Love is like the painter, who, being to draw the *picture* of a friend having a blemish in one eye, would *picture* only the other side of his face. *South.*

Fond man,
See here thy *pictured* life.
Thomson's Winter.

She often shows them her own *picture*, which was taken when their father fell in love with her. *Law.*

Borne on fine wires amid the *pictured* skies
With ivory orbs the planets set and rise;
Round the dwarf earth the pearly moon is rolled,
And the sun twinkling whirls his rays of gold.
Darwin.

PICTURESQUE BEAUTY refers to 'such beautiful objects as are suited to the pencil.' This epithet is chiefly applied to nature, though it will often apply to the works of art also. Those objects are most properly denominated picturesque which are disposed by the hand of nature with a mixture of varied rudeness, simplicity, and grandeur. A plain neat garden, with little variation in its plan, and no striking grandeur in its position, displays too much of art, design, and uniformity, to be called picturesque. 'The ideas of neat and smooth,' says Mr. Gilpin, 'instead of being picturesque, in fact, disqualify the object in which they reside from any pretensions to picturesque beauty. Nay, farther, we do not scruple to assert that roughness forms the most essential point of difference between the beautiful and the picturesque; as it seems to be that particular quality which makes objects chiefly pleasing in painting. I use the general term roughness; but, properly speaking, roughness relates only to the surfaces of bodies: when we speak of their delineation we use the word ruggedness. Both ideas, however, enter equally into the picturesque, and both are observable in the smaller as well as in the larger parts of nature; in the outline and bark of a tree, as in the rude summit and craggy sides of a mountain.

'Let us then examine our theory by an appeal to experience, and try how far these qualities enter into the idea of picturesque beauty,

and how far they mark that difference among objects which is the ground of our enquiry. A piece of Palladian architecture may be elegant in the last degree; the proportion of its parts, the propriety of its ornaments, and the symmetry of the whole, may be highly pleasing: but, if we introduce it into a picture, it immediately becomes a formal object, and ceases to please. Should we wish to give it picturesque beauty, we must use the mallet instead of the chisel: we must beat down one half of it, deface the other, and throw the mutilated members around in heaps; in short, from a smooth building we must turn it into a rough ruin. No painter who had the choice of the two objects would hesitate a moment. Again, why does an elegant piece of garden ground make no figure on canvas?—The shape is pleasing, the combination of the objects harmonious, and the winding of the walk is the very line of beauty. All this is true; but the smoothness of the whole, though right, and as it should be in nature, offends in picture. Turn the lawn into a piece of broken ground, plant rugged oaks instead of flowering shrubs, break the edges of the walk, give it the rudeness of a road, mark it with wheel tracks, and scatter around a few stones and brush-wood; in a word, instead of making the whole smooth, make it rough, and you make it also picturesque. All the other ingredients of beauty it already possessed.'

Picturesque composition, in art, may be defined, to speak generally, as the art of uniting, in one whole, a variety of irregularly grand and striking parts, which parts may be sought and found among the works of art, though in a far less proportion, as well as in the works of nature. Objects may likewise be made picturesque: this, however, is hazardous work, and there is no small danger of missing the picturesque and falling into the ridiculous. Artificial ruins, for example, can seldom be regarded as matters of good taste: and, when the trick is known, the eye, or rather the imagination through the medium of the eye, refuses to recognise therein any of the principles of romantic beauty sought to be imparted. The great source of picturesque beauty is Nature in all her original variety and irregular grandeur. 'We seek it,' says the authority quoted above, 'among all the ingredients of landscape—trees, rocks, broken grounds, woods, rivers, lakes, plains, valleys, mountains, and distances. These objects, in themselves, produce infinite variety; no two rocks or trees are exactly the same; they are varied a second time by combination; and almost as much a third time by different lights and shades, and other aerial effects. Sometimes we find among them the exhibition of a whole, but oftener we find only beautiful parts.'

PICUIPINIMA, in ornithology, is the name of a species of pigeon in Brasil. It is so very small as scarcely to exceed the lark in size. Its head, neck, and wings, are of a pale lead color, with a black semilunar mark at the extremity of each wing; but its long wing-feathers, which are seen when the wings are expanded in flying, are of a reddish brown on one side, and blackish on the other, with black ends or tips; the tail is long, and is variegated with black, white, and brown; the belly is covered with white feathers, every one of which has a brown mark of the shape of a half-moon at the end.

PICUMNUS AND PILUMNUS, were two deities at Rome, who presided over the auspices required before the celebration of nuptials. Pilumnus was supposed to patronise children, as his name seems in some manner to indicate, quod pellit mala infantiæ. The manuring of land was first invented by Picumnus, for which reason he is called Sterquilinius. Pilumnus is also invoked as the god of bakers and millers, as he is said to have first invented the art of grinding corn.

PICUS, in fabulous history, a king of Latium, son of Saturn. He married Venilia, or Canens, by whom he had Faunus; was beloved by the goddess Pomona, and returned her affection. As he was one day hunting in the woods he was met by Circe, who became deeply enamoured of him, and who changed him into a woodpecker, called by the name of picus among the Latins. His wife Venilia was so disconsolate, when she was informed of his death, that she pined away. Some say that Picus was the son of Pilumnus, and that he gave out prophecies to his subjects by means of a favorite woodpecker; from which originated the fable of his being metamorphosed into that bird.

PICUS (John), earl of Mirandola, a prodigy of parts and learning, was the youngest child of John Francis Picus, earl of Mirandola and Concordia; and was born in 1463. The progress that he made in letters was extremely rapid. He was the scholar of R. Jochanan, a German Jew, who confirmed his natural fondness for the cabalistical writings. After visiting the most famous universities of France and Italy, he went to Rome; where, in 1486, before he was twenty-four years of age, he published 900 propositions in logic, mathematics, physics, divinity, cabalistic learning, and magic, drawn not only from Greek and Latin, but even from Jewish and Arabian writers; subjoining to his advertisement, that, 'if any philosopher or divine would come to Rome to dispute with him upon any or all of them, he would defray the expenses of his journey from the remotest corners of Italy.' But, some of his propositions being charged with heresy, he was forbid to dispute upon them. At the age of twenty-eight he confined himself wholly to the study of the Scriptures; and undertook to combat the Jews and Mahometans, as well as to confound judicial astrology. He died in 1494, in his thirty-second year. He was called the phœnix of his age, and by Scaliger Monstrum sine Vitio. He composed a great number of works, which have often been printed.

PICUS (John Francis), prince of Mirandola, nephew of John Picus mentioned above, was born about the year 1469. He cultivated learning and the sciences after the example of his uncle; but had a principality and dominions to superintend, which involved him in great troubles, and at last cost him his life. He was twice driven from his principality, and twice restored; and at last, in 1533, was, together with his eldest son Albert, assassinated in his own castle by

his nephew Galeoti. He was a great lover of letters; and such of his works as were then composed were inserted in the Strasburgh edition of his uncle's in 1504, and continued in future impressions, besides some others which were never collected.

Picus, the woodpecker, in ornithology, a genus belonging to the order of picæ. The beak is straight, and consists of many sides, and is like a wedge at the point: the nostrils are covered with bristly feathers; the tongue is round like a worm, very long, and sharp at the point, which is beset with bristles bent backwards. The grand characteristic, says Latham, of these birds is the tongue (which in no bird is similar, the wryneck excepted, whose other characters, however, differ too widely to give it place in this class), the muscles necessary to the motions of which are singular and worthy of notice; affording the animal means of darting it forwards the whole length, or drawing it within the mouth at will. Mr. Latham enumerates no fewer than fifty species of woodpeckers, and nine varieties. The most remarkable are: 1. P. auratus, the gold-winged woodpecker, is about eleven inches long, and weighs about five ounces. The bill is an inch and a half long, and is somewhat bent, and is not square but roundish, ridged only on the top, the point being sharp; the upper parts of the head and neck are ash-colored; the hind head is red; the sides of the head, throat, and fore part of the neck, are pale yellow; on each side of the head is a stripe of black, from the base of the lower jaw to the neck; the back, scapulars, and wing-covers, are of a gray brown color, transversely striated with black lines; the rump is whitish; the breast, belly, and sides, are whitish-yellow, and each feather is marked with a round black spot at the tip; on the middle of the breast there is a large crescent of black; the thighs, upper and under tail-coverts, are black and white mixed; the quills are brown, with yellow shafts spotted with brown on the outer edge; the tail is blackish, being outwardly edged with gray; the other feather is dotted with whitish on the margins; the shafts of all but the two middle feathers are yellow half way from the base; and the legs and claws are brown. The female differs in having the crown and neck behind gray-brown; the hind head of a less vivid red; and the greater quills not spotted on the edges. She also wants the black list on the throat, but otherwise is like the male. This species inhabits Virginia, Carolina, and Canada, and abounds in New Jersey and about New York, where it is called by some hittock or pint, and by others high-hole. Both the former names have some relation to its note; and the latter, perhaps, to the situation of the nest. It is almost continually on the ground, and is not observed to climb on the trees like others of the genus. It lives chiefly on insects, and is commonly very fat, so as to be thought very palatable for the table. It stays all the year. In its form, and some of its qualities, it resembles the cuckoo. It flies to the top of trees, and sits occasionally on the branches. Forster, in the Philosophical Transactions, says it is a bird of passage in the northern parts of America, visiting the neighbourhood of Albany Fort in April, and leaving it in September: that it lays from four to six eggs, in hollow trees, and feeds on worms and other insects.

2. P. erythrocephalus, the red-headed woodpecker, is about eight inches and three-quarters long, and weighs two ounces. The bill is an inch and a quarter in length, of a lead color, with a black tip; the irides are dusky; the head and the neck are of a most beautiful crimson; the back and wings are black; the rump, breast, and belly, are white; the first ten quills are black, the eleventh black and white, and the others are white with black shafts; the tail is black and cuneiform; the legs and claws are of a lead color. The cock and hen are very nearly alike. This species inhabits Virginia, Carolina, Canada, and most of the parts of North America; but, at the approach of winter, it migrates more or less to the south, according to the severity of the season; and upon this circumstance the people of North America foretel the rigor or clemency of the ensuing winter. Kalm observes that it is a very common bird, and is very destructive to the maize fields and orchards, pecking through the ears of maize, and destroying great quantities of apples. In some years they are more numerous than in others, when they attack the orchards where the sweet apples grow, which they eat so far that nothing remains but the mere peels. Some years ago there was a premium of two-pence per head paid from the public fund to extirpate these pernicious birds. They are likewise very fond of acorns. In Virginia and Carolina they stay the whole year, but are not seen in such numbers in winter as in summer. During the winter they are very tame, and often come into the houses, as the redbreast does in England. This species is found chiefly in old trees; and the noise they make with their bills may be heard above a mile distant. It builds the earliest of all the woodpeckers, and generally pretty high from the ground. It is accounted very good eating.

3. P. flavus, the yellow woodpecker, is about nine inches long. The bill is of a yellowish white, and more than an inch long; the hind head is crested; the head itself, the neck, and whole body, are covered with dirty-white feathers; from the lower jaw to the ears, on each side, there is a red stripe; the wing-coverts are brown and edged with yellowish, and some of the greater ones are mixed with rufous on the inner web; the quills are brown or rufous; the tail is black; the legs and claws are gray. This species is common at Cayenne, and is called there chapentier jaune. It makes its nest in old trees which are rotten within; making with its bill a hole from without, at first horizontal, but declining downward as soon as it has pierced through the sound part, till it is at last a foot and a half below the first opening. The female lays three white, and nearly round, eggs, and the young are hatched about the beginning of April. The male bears his share in the work with the female; and, in her absence, keeps sentinel at the entrance of the hole. The note of this bird is a kind of whistle six times repeated, of which the two or three last are in a graver accent than

the others. The female wants the red band on the side of the head which the male has. Specimens vary; some are of that dirty-white, as Brysson describes it, others of a light-yellow; which last was the case in a specimen in the Leverian museum: this is thirteen inches in length.

4. P. major, the great spotted woodpecker, weighs two ounces and three-quarters; the length is nine inches, the breadth sixteen. The bill is one and a quarter long, of a black horn color. The irides are red. The forehead is of a pale buff-color; the crown of the head a glossy black; the hind part marked with a rich deep crimson spot. The cheeks are white, bounded beneath by a black line, that passes from the corner of the mouth, and surrounds the hind part of the head. The neck is encircled with a black color; the throat and breast are of a yellowish-white; the vent-feathers of a fine light crimson. The back, rump, and coverts of the tail, and lesser coverts of the wings, are black; the scapular feathers, and coverts adjoining to them, are white. The quill feathers are black, elegantly marked on each web with round white spots. The four middle feathers of the tail are black, the next tipped with dirty-yellow; the bottoms of the two outmost black; the upper parts a dirty-white. The exterior feathers marked on each web with two black spots; the next with two on the inner web, and only one on the other. The legs are of a lead color. The female wants that beautiful crimson spot on the head; in other respects the colors of both agree. This species is much more uncommon than the viridis, No. 10, and keeps altogether in the woods. They are pretty common in England, France, Germany, and other parts of Europe, frequenting the woods, and are likewise met with in America. They are very cunning, and hide themselves when observed. The extreme facility with which these birds descend and ascend the trees is surprising.

5. P. martius, the greatest black woodpecker, is about the size of a jackdaw, being about seventeen inches long; the bill is nearly two inches and a half in length, of a dark ash color, and whitish on the sides; the irides are pale yellow, and the eyelids are naked according to Scopoli; the whole bird is black, except the crown of the head, which is vermilion; the first quill-feather is the shortest, and the two middle tail-feathers, which are longer than the others, make it appear a little rounded; the legs are of a lead color, covered with feathers on the fore part for half their length. The female differs from the male in having the hind head only red, and not the whole crown of the head; and the general color of the plumage has a strong cast of brown in it. Sometimes the red on the hind head is wholly wanting; and indeed both male and female vary in different subjects, in their proportion of red on the head. This species is found on the continent of Europe, but is numerous only in Germany. It is not an inhabitant of Italy or France, but it is found in Sweden, Switzerland, and Denmark, though not in winter. It builds in old ash and poplar trees, making large and deep nests; and Frisch observes that they often so excavate a tree that it is soon after blown down with the wind; and that under the hole of this bird may often be found a bushel of dust and bits of wood. The female lays two or or three white eggs, the color of which is peculiar to the whole of the genus.

6. P. medius, the middle-sized woodpecker, agrees with the major (No. 4) in colors and size, excepting that the crown of the head of this is of a rich crimson; the crown of the head in the male of the former black; and the crimson is in form of a bar on the hind part. Birds thus marked have been shot in Lancashire, and other parts of England; but Mr. Pennant is doubtful whether they are varieties, or distinct species.

7. P. minor, the least spotted woodpecker, scarcely weighs an ounce: the length is six inches; the breadth eleven. The forehead is a dirty white: the crown of the head in the male of a beautiful crimson: the cheeks and sides of the neck are white, bounded by a bed of black beneath the former. The hind part of the head and neck, and the coverts of the wings, are black; others varied with black and white; the breast and belly are of a dirty white: the crown of the head, in the female, is white; the feet are of a lead color. It has all the characters and actions of the greater kind, but is not so often met with. Buffon affirms that it inhabits most parts of France. It approaches near habitations in winter, and may be seen in orchards adjoining to houses. It builds in a hole of a tree, and often disputes the right of possession with the little colemouse. Willoughby says it is called in England by the name of hickwall. It is said to inhabit the higher parts of Asia.

8. P. principalis, the white-billed woodpecker, is somewhat bigger than the martius (No. 5) and equal in size to a crow. It is sixteen inches long, and weighs about twenty ounces. The bill is white as ivory, three inches long, and channelled; the irides are yellow, and on the hind head is an erect pointed crest, of a fine red color, some of the feathers of which are two inches long; the head itself, and the body in general, are black; but the lower part of the back, rump, and upper tail-coverts, are white; from the eye there arises a stripe of white, which passes on each side of the neck down to the back; three or four of the prime quills are black, but the rest are white; the tail is cuneiform, and of the same color as the body; the legs and claws are also black. This species inhabits Carolina, Virginia, New Spain, and Brasil, and is called by the Spaniards carpenter, and not without reason, as this, as well as the other species, make a great noise with the bill against the tree, in the woods, where they may be heard at a great distance, as if carpenters were at work, making, according to Catesby, in an hour or two a bushel of chips. He adds that the Canadian Indians make use of the bills of these birds for coronets, setting them round in a wreath with the points outwards; and that the northern Indians purchase them of the southern at the rate of two or three buck skins' per bill. Kalm says they are found in New Jersey, though very seldom, and only at certain seasons.

9. P. pubescens, the little wookpecker, according to Catesby, weighs only about an ounce and a half. Brisson says it is larger than the

smallest of our European species, being about five inches and a half long. The bill is about ght lines long, and of a horn color; the top of the head is black, and on each side above the eye is a white line; the hind head is red: the hind parts of the neck, the back, and rump are black, which is divided into two parts by a line of white passing down the middle to the rump; the scapulars, upper wing, and tail-coverts are black; the greater wing-coverts and quills are spotted with white; the under parts of the body are pale gray; the tail is black; the four middle feathers are plain, the rest are barred with white and black; and the legs and claws are black. The female has no red on the hind head. Linnæus says that the outer tail-feather is white, marked with four black spots. This species inhabits Virginia and Carolina. According to Kalm, it abounds in New Jersey, where it is the most daring and dangerous to orchards. As soon as it has pecked one hole in a tree, it makes another close to the first, in a horizontal direction, proceeding till it has made a circle of holes quite round the tree; and the apple-trees in the orchards have often several rings of holes round the stem, insomuch that the tree frequently dries up and decays.

10. P. viridis, the green woodpecker, weighs six ounces and a half; its length is thirteen inches, the breadth twenty and a half; the bill is dusky, triangular, and nearly two inches long; the crown of the head is crimson, spotted with black, and the males have a rich crimson mark beneath the blackness; the back, neck, and lesser coverts of the wings, are green; the rump of a pale yellow; the whole of the under part of the body is of a very pale green, and the thighs and vent are marked with dusky lines; the legs and feet are of a cinereous green; the tail consists of ten stiff feathers, whose ends are generally broken, as the bird rests on them in climbing; their tips are black; the rest of each is alternately barred with dusky and deep green. These birds feed entirely on insects; and their principal action is that of climbing up and down the bodies or boughs of trees; for the first purpose they are provided with a long slender tongue, armed with a sharp bone, and barbed on each side, which by the means of a curious apparatus of muscles they can exert at pleasure, darting it to a great length into the clifts of the bark, transfixing and drawing out the insects that lurk there. They make their nests in the hollows of trees: in order, therefore, to force their way into these cavities, their bills are formed strong, very hard, and wedge-like at the end; Dr. Derham observes, that a neat ridge runs along the top, as if an artist had designed it for strength and beauty. Yet it has not power to penetrate a sound tree; their perforation of any tree is a warning to the owner to throw it down. Their legs are short, but strong; their thighs very muscular; their toes disposed two backward, two forward; the feathers of the tail very stiff, sharp pointed, and bending downwards. The first three circumstances admirably concur to enable them to run up and down the sides of trees with great security; and the strength of the tail supports them firmly when they continue long in one place, either where they find plenty of food, or while they are forming an access to the interior part of the timber. This form of the tail makes their flight very aukward, as it inclines their body down, and forces them to fly with short and frequent jerks when they would ascend, or even keep in a line. This species feeds oftener on the ground than any other of the genus: all of them make their nests in the hollows of trees; and lay five or six eggs, of a beautiful semi-transparent white. These birds sometimes build in a hollow ash or other tree, fifteen or twenty feet from the ground. The male and female take it by turns to bore through the living part of the wood, till they come to the rotten part, wherein, after being hollowed out to a proper depth, they lay their eggs, which are generally greenish, with small black spots. These holes are so deep, that a man may thrust his whole arm down one of them till he reach the eggs. The young ones climb up and down the tree before they can fly. The holes of the woodpecker are as perfectly round as if made by a pair of compasses. Nuthatches, starlings, and bats, frequently build in these holes when deserted. Both Frisch and Klein mistake in saying that the females have not the red crown; for even the young ones in the nest have the appearance of it; but they do not become of a full red till after the first moult. They are fond of bees, and make great havock among them. Salerne says they are found in the markets of Italy. In Sir A. Lever's museum there was a variety of this bird of a straw color, except the crown, which is faintly marked with red.

PIDDLE, *v. n.* & *n. s.* This word is obscure in its etymology, says Johnson. Skinner derives it from Ital. *picciolo*, or Fr. *petit*, little. Mr. Lye thinks it the diminutive of the Welsh *breyta*, to eat; perhaps it comes from peddle, to deal in little things. It is used also as a diminutive of puddle.

> From stomach sharp, and hearty feeding,
> To *piddle* like a lady breeding.
> *Swift's Miscellanies.*

I speak only of the general outline of their constitution; *piddling* objections may be made to particular parts, and experience will point out the necessity of reconsidering many things. *Bp. Watson.*

PIE, *n. s.* Derived by Skinner from biezan to build, that is, to build of paste; by Junius, by contraction from pasty; a crust baked with something in it.

> No man's *pie* is freed
> From his ambitious finger.
> *Shakspeare. Henry VIII.*

Mincing the meat in *pies* saveth the grinding of the teeth, and more nourishing to them that have weak teeth. *Bacon.*

He is the very Withers of the city; they have bought more editions of his works than would serve to lay under all their *pies* at a lord mayor's Christmas. *Dryden.*

> Chuse your materials right;
> From thence of course the figure will arise,
> And elegance adorn the surface of your *pies*.
> *King.*

Eat beef or *pie*-crust, if you'd serious be. *Id.*

PIE, *n. s.* } Fr. *pie*; Lat. *pica*. A mag-
PIE'BALD, *adj.* } pie; a party-colored bird:
PIED } hence of various colors: pie-
PIED'NESS, *n. s.* } bald and pied signify variegated.

The *pie* will discharge thee for pulling the rest. *Tusser*

There is an art, which in their *piedness* shares
With great creating nature.
Shakspeare. Winter's Tale.

The raven croaked hoarse on the chimney's top,
And chattering *pies* in dismal discords sung.
Shakspeare.

All the yearlings which were streaked and *pied*,
Should fall as Jacob's hire. *Id. Merchant of Venice.*

Pied cattle are spotted in their tongues. *Bacon.*

The seat, the soft wool of the bee,
The cover, gallantly to see,
The wing of a *pied* butterfly,
I trow 'twas simple trimming. *Drayton.*

They desire to take such as have their feathers of *pied*, orient and various colours. *Abbot.*

Meadows trim with daisies *pied*,
Shallow brooks and rivers wide. *Milton.*

It was a particoloured dress
Of patched and *piebald* languages.
Hudibras.

Who taught the parrot human notes to try,
Or with a voice endu'd the chattering *pie*?
'Twas witty want. *Dryden.*

They would think themselves miserable in a patched coat, and yet contentedly suffer their minds to appear abroad in a *piebald* livery of coarse patches and borrowed shreds. *Locke.*

They are pleased to hear of a *piebald* horse that is strayed out of a field near Islington, as of a whole troop that has been engaged in any foreign adventure. *Spectator.*

Peel'd, patch'd, and *piebald*, linsey-woolsey brothers,
Grave mummers! sleeveless some, and shirtless others. *Pope.*

PIE, *n. s.* Sax. pie; Fr. *pie*. An old popish service-book, so called, as is supposed, from the different colors of the text and rubric. 'Cock and pie,' says Dr. Johnson, 'was a slight expression in Shakspeare's time, of which I know not the meaning.' It means the above, a book of devotion; a rubric. Lat. *coccus* and *pius*.

Mr. Slender, come; we stay for you.
—I'll eat nothing, I thank you, Sir;
—By cock and *pie* you shall not chuse, Sir; come, come. *Shakspeare. Merry Wives of Windsor.*

PIE POWDER COURT, in English law, curia pedis pulverizati, the court of Dusty-foot, from the French pied, pes, and poudreux, pulverulentus, a court held in fairs, to administer justice to buyers and sellers, and for redress of disorders committed in them. Skene, de Verbor. signif., verbo Pes-pulverosus says, the word signifies a vagabond; especially a pedlar, who has no dwelling, therefore must have justice summarily administered to him, viz. within three ebbings and three flowings of the sea. Bracton, lib. 5, tract. 1, c. 6, num. 6, calls it Justitiam pepoudrous. Of this court, read the statute 17 Edw. IV. c. 2: 4 Inst. 272: and Cromp. Jur. 221. Among our Saxon ancestors it was called ceapung-gemot, i. e. a court of merchandise, or handling matters of buying and selling. It is mentioned in Doctor and Student, c. 5, which says, it is a court incident to fairs and markets, to be held only during the time that the fairs are kept.—Cowell. The fair of St. Giles, held on the hill of that name, near the city of Winchester, by virtue of letters patent of king Edw. IV., has a court of Pie-powder of a transcendant jurisdiction; the judges whereof are called justices of the Pavilion, and have their power from the bishop of Winchester.

PIECE, *n. s.*, *v. a.*, & *v. n.* } French *piece*;
PIECE'LESS, *adj.* } Ital. *pizza*, *pe-*
PIECE'MEAL, *adj.* & *adv.* } *cia*; Span. *pieza*; barb. Lat. *petia*. A part; fragment; portion; complete part or specimen; picture; composition; performance; great or small gun; coin: to piece is to add to or repair by pieces: hence to join; unite; coalesce: pieceless, an obsolete adjective for whole; not made up of separate or different pieces: piece-meal (Sax. pice-mel), in pieces; single; separate: a-piece is an idiomatical expression for 'to each' (piece or person); 'of a-piece,' signifies like, i. e. as of the same piece.

Bring it out *piece* by *piece*. *Ezek.* xxiv. 26.

The chief captain, fearing lest Paul should have been pulled in *pieces* of them, commanded to take him by force. *Acts.*

When he cometh to experience of service abroad, or is put to a *piece* or a pike, he maketh as worthy a soldier as any nation he meeteth with. *Spenser.*

Pyrrhus, with continual battery of great *pieces*, did batter the mount.
Knolles's History of the Turks.

A *piece* of ordnance 'gainst it I have placed.
Shakspeare.

I speak too long, but 'tis to *piece* the time,
To draw it out in length. *Id. Merchant of Venice.*

He *pieces out* his wife's inclination; he gives her folly, motion, and advantage. *Shakspeare.*

Many of the ships have brass *pieces*, whereas every *piece* at least requires four gunners to attend it.
Raleigh's Essays.

Plant it with women as well as men, that it may spread into generations, and not be *pieced* from without. *Bacon.*

The cunning priest chose Plantagenet to be the subject his pupil should personate; because he was more in the present speech of the people, and it *pieced* better and followed more close upon the bruit of Plantagenet's escape. *Id.*

In those poor types of God, round circles; so
Religion's types the *pieceless* centres flow,
And are in all the lines which always go.
Donne.

He strook his helme, full where his plume did stand,
On which it *piece-meal* brake, and fell from his unhappy hand. *Chapman.*

I'll be torn *piecemeal* by a horse,
Ere I'll take you for better or worse.
Hudibras.

Truth and fiction are so aptly mixed,
That all seems uniform and *of a piece*.
Roscommon.

I demand, concerning all those creatures that have eyes and ears, whether they might not have had only one eye, and one ear a-*piece*. *More.*

It is accounted a *piece* of excellent knowledge, to know the laws of the land. *Tillotson.*

Whether the *piecing out* of an old man's life is worth the pains, I cannot tell. *Temple.*

If unnatural, the finest colours are but dawbing, and the *piece* is a beautiful monster at the best.
Dryden.

My own is *of a piece* with his, and, were he living, they are such he would have written. *Id.*

Too justly ravished from an age like this;
Now she is gone, the world is *of a piece*. *Id.*

When Jupiter granted petitions, a cockle made request, that his house and his body might be all *of a piece*. *L'Estrange.*

These lesser rocks or great bulky stones, that lie scattered in the sea or upon the land, are they not manifest fragments and *pieces* of these greater masses? *Burnet.*

Neither was the body then subject to distempers, to die by *piecemeal*, and languish under coughs or consumptions. *South.*

He wrote several *pieces* which he did not assume the honour of. *Addison.*

A man that is in Rome can scarce see an object, that does not call to mind a *piece* of a Latin poet or historian. *Id.*

Other blasphemies level, some at one attribute, some at another; but this, by a more compendious impiety, shoots at his very being, and, as if it scorned these *piecemeal* guiles, sets up a single monster big enough to devour them all. *Government of the Tongue.*

When once the poet's honour ceases,
From reason far his transports rove;
And Boileau, for eight hundred *pieces*,
Makes Louis take the wall of Jove. *Prior.*

Why did I not his carcase *piecemeal* tear,
And cast it in the sea? *Derham.*

The ball goes on in the direction of the stick, or of the body of the *piece* out of which it is shot. *Cheyne.*

Each heavenly *piece* unweary'd we compare,
Match Raphael's grace with thy loved Guido's air. *Pope.*

Piecemeal they win this acre first, then that;
Glean on and gather up the whole estate. *Id.*

His other *pieces* were read only by those few who delight in obsolete books. *Johnson.*

PIECE, in matters of money, signifies sometimes the same thing with species; and sometimes, by adding the value of the pieces, it is used to express such as have no other particular name.

PIECE is also a kind of money of account, or rather a manner of accounting, used among the negroes on the coast of Angola in Africa. See MONEY.

PIECE, in heraldry, denotes an ordinary or charge. The honorable pieces of the shield are the chief, fess, bend, pale, bar, cross, saltier, chevron, and in general all those which take up one-third of the field, when alone, and in what manner soever it be. See HERALDRY.

PIECES, in the military art, include all sorts of great guns and mortar. Battering pieces are the larger sort of guns used at sieges for making the breaches; such are the twenty-four pounder and culverine, the one carrying a twenty-four and the other an eighteen pound ball. Field pieces are twelve pounders, six pounders, &c., which march with the army. A soldier's firelock is likewise called his piece.

PIEDMONT, a province of Sardinia, forming the north-west portion of Italy, having France on the west, and Lombardy on the east. It is the principal continental province of the kingdom, and contains a superficial extent of nearly 13,000 square miles, which presents a succession of mountains and hills, commencing to the west with the loftiest of the Alps, and gradually diminishing in height as they approach the beautiful plains which form the central part of the province, and extend to Lombardy. Piedmont is of an oblong form, and largest from north to west. It is watered in its whole breadth by the Po, which receives a number of rivers and streams descending from the mountains, as the two Doras, the Stura, Orco, Sesia, Tanaro, Borbio, and Varo. In the mountainous regions of the province, the snow and ice remain during a great part of the year; in the plains the climate during winter is temperate, and the heat of summer is moderated by the vicinity of the Alps. Piedmont is considered very fertile, the soil consisting for the most part of a rich sandy loam, which, with extensive irrigation, produces abundant crops of wheat, barley, rye, and maize; and in the lower grounds rice. The hills are in general covered with vineyards, the produce of which is abundant, but not of superior quality. Olives, almonds, chestnuts, figs, oranges, and lemons are also raised. The pastures are extensive, and the rearing of cattle forms one of the chief branches of industry. A still greater is the culture of silk, which is raised in immense quantities, and preferred to all the other silks of Italy. In mineral productions, too, Piedmont is the richest tract in Italy. The principal manufactures are the spinning and weaving of silk; linen, cotton, and woollens, are also made. The exports consist of raw and manufactured silk, cattle, wine, fruit, butter, hides, and wool.

Lady Morgan's lively representation of the first impressions produced by the scenery of Piedmont, on descending the Cottonian Alps, we shall here transcribe:—

'The traveller who ascends from Lans-le-bourg, shivering with cold and shuddering with apprehension, descends into the town of Susa, glowing under the rays of summer suns, and not more intoxicated by their 'soft ethereal warmth' than by the pleasurable consciousness which attends the first arrival in a country unknown and unexplored. The shading off of moral distinctions, the fading of one nation into another, is first observed at the last post-house of Mount Cenis, where the postilions reply to the traveller's questions in a jargon composed of bad French, Italian, and Piedmontese. But nature's distinctions are more broadly marked. Not a trace of the eminently French characteristics of the Savoyards can be found in the population on the Italian side of the mountain.

'The pass of Susa, opening its narrow defile at the foot of the Cottonian Alps, defended by its antique fortress, the Brunetta, was one of infinite importance in days when military tactics were guided by the obstacles or facilities which nature supplied; and it had obtained the name of La chiava d'Italia. The town of Susa, made the capital of Piedmont under its marquises, is small and inconsiderable; but it is striking, not only by a population that seems made up of priests and soldiers, but by the pious frescoes, which cover the walls even of its meanest buildings; converting sties into stations, and hovels into oratories. Many of these were ancient,

and not ill-executed; others were new or refreshed, and smacked of the restoration. The façade of one house represented the Virgin and and the angel Gabriel 'in converse sweet,' encircled with fluttering cupids armed with bows. The portico of another exhibited St. Dominick ogling the Magdalen, who lay at his feet. Here St. Peter had his keys new gilt; and there St. Paul his sword new hafted. Every where purgatory, with most corporeal souls burning in flames of most material fire, quickened the penitent or threatened the sinner. Even the trading interests of the town sought the patronage of theology. Death, with his scythe, hung over the shop, whose inscription intimated that qui si vende acqua vita; and prayers for the souls of the dead, and the dying, were solicited over the inn-door, whence the timid travellêr departs for the perilous Alps.

'All in this little frontier town, remote and obscure as it lay under the shadows of impending snow-mountains, indicated the vigorous revival of antique state and feudal power; and all the external testimonies of the rule and sway of his Sardinian majesty, which we had left in Savoy (the Ireland of his little monarchy), were quadrupled in the first town of his Piedmontese dominions. Every where the crown glittered over those royal slop-shops so numerous on the continent, where kings, becoming retail dealers, seize the monopoly of powder, tobacco, cards, paper, and salt; and deprive their subjects of the legitimate means of subsistence, and of paying their heavy taxation. Every where the monk prowled, the sentinel challenged, and the police interfered. Even the feudal fortress was reinstated in its ancient array; and the fort of the Brunetta, with its bastions and brown rocks (dismantled by the French) now once more raises its crenelles, and its barbicans, parades its warder, and exhibits its governor as in the days of the Green Count, and Tête de Fer of Savoy. Machiavel has observed that a passion for raising castles and fortresses, in the middle ages, did more injury to society than any other of the disorders of those dark times, 'che alcuno altro disordine di quello stato' (Il Principe). The king of Sardinia is, however, now raising forts on every pinnacle in his Alpine States; and his fort of St. Michael, which was building as we passed through Savoy, on the frightful heights of Mount St. André, at an enormous expense and risk of human lives, will long remain a monument of the efforts made by kings, who, in the nineteenth century, are pretty much what kings were in the ninth. Susa, with all its errors on its head, is reached with delight, and left with regret. It is the first stage in the series of pleasurable sensations; and perhaps both the pleasure and the regret are derived from those very faults which, while they indicate a systematic effort at social retrogradation, give to sites their most picturesque features and distinguished forms.

'The road from Susa to Turin, including a distance of forty miles, lies through a fertile plain, bathed by La Piccola Dora, and occasionally undulated with abrupt hills and high perpendicular rocks, which become gradually smaller, and more remote as the pass opens and the mountains are cleared. These elevations have been seized in former times for the purposes of Church and State, and are covered with dilapidated cloisters and ruined fortresses, that now add much to the beauty of the scenes in which they dominate. The dismantled towers of St. Joire, and the ruined walls of the famous abbey of St. Benedict (the cradle of his order), still fix the upturned eye, and command a valley flowing with milk and honey; while the castle of Avegliana lords the plain above the wretched village, which deforms its base, and was once the dependency of its power. Vines draped round sturdy oaks, groves of mulberries, and fields of young, rich, ripening corn, every where contrast the resources of natural and national prosperity with exhibitions of moral suffering and human infirmity. It is in these laughing vales that beggary assumes its most disgusting form, and that want and penury are not the least evils the wretched have to contend with. As often as we stopped to change horses, groups of miserable beings crawled round, and raised the deafening cry of 'Carità, Elemosina,' in the name of those negligent saints who had abandoned them to every species of physical evil. All the maladies incidental to the Alpine region seemed here accumulated. Some were blind, others devoured with scrofula, and few had their entire complement of limbs and senses. But by far the most shocking objects were the Cretins, here strikingly numerous; and their idiot chatter and wild laugh were more fearful than even maimed limbs and distorted forms. Opposed to these groups usually stood the mistress of the post-house, with a head piled with towers of lace and ribands in all the opulence and pride of the Piedmontese toilet, the spruce gens-d'armes with whom she coquetted, the whiskered corporal of the village detachment quaffing his boccale at the door, and the sleek, sly, well-fed friar again permitted to present his scrip and his benedicite at every gate. While such was the population, the road was the very abstract of all the 'crackskull commons' of Europe; and it put the springs of our carriage so often to the test, that more than once we were obliged to beg the postilions to moderate their pace; a precaution rarely necessary with Italian post-boys. To our suggestions they usually replied, by pointing to a noble line of road marked parallel to our own, with the information of 'Ecco la strada Francese,' 'There is the French road,' which was soon to be finished. This assertion, however, did not appear very probable if we might judge by the way in which the work was carried on. For it was consigned to the labor of a few old men, old women, and little boys, with a wheel-barrow and a shovel for their only implements. The most curious circumstance, however, in this new road was, that some of the nobles whose estates lie contiguous, object to it as French and revolutionary.

'From Rivoli begins a spacious and beautiful avenue, shaded with double rows of lofty trees; it runs for two leagues, through plains of high cultivation, and terminates only at the entrance of Turin, where spires, turrets, and belfries, are

caught but at intervals; while the church of the Superga, towering above all, forms the leading point of the brilliant coup-d'œil. As the capital is approached, its splendid position amidst an amphitheatre of vine-covered hills is strikingly picturesque;' but see TURIN.

The population of Piedmont amounts to about 1,750,000, who, with the exception of 20,000 Waldenses, are all Catholics. The inns and accommodations for travellers are poor, and in all the arts of life the inhabitants are backward. They are, however, industrious, and considerable improvements were introduced by the French from 1798 to 1814. In a military sense, Piedmont is strong on the side of France, but exposed on that of Lombardy. Its southern division was in 1794 and 1795 long the scene of undecisive military operations between the French and allies; but in April, 1796, the arrival of Buonaparte brought the French army into the heart of the country, and obliged the court of Turin to make a separate peace. This was followed in the course of two years by the incorporation of Piedmont with France, under the name of the departments of the Stura, Tanaro, Po, Sesia, Dora, Marengo, and Maritime Alps. These divisions were abolished in 1816, and a subdivision into twenty-six districts adopted, viz. Turin, Acqui, Alba, Alessandria, Aosta, Asti, Biella, Casale, Cuneo, Ivrea, Mondovi, Montona, Novara, Palanza, Pignerolo, Saluzzo, Susa, Tortona, Vercelli, Vigeronne, Voghera, Sesia, Domo d'Ossola, Nice, Sospello, Oneglia. See SARDINIA.

PIE'LED, *adj.* Scot. *peild;* Lat. *pilatus.* Having short hair; bald.

Pieled priest, dost thou command me be shut out?
—I do. *Shakspeare. Henry VI.*

PIER, *n. s.* Fr. *pierre.* The column of an arch; any abutment or support; a dam against water.

Oak, cedar, and chesnut are the best builders; for *piers* sometimes wet, sometimes dry, take elm. *Bacon.*

The English took the galley, and drew it to shore, and used stones to reinforce the *pier.* *Hayward.*

The bridge, consisting of four arches, is of the length of six hundred and twenty-two English feet and a half: the dimensions of the arches are as follows, in English measure; the height of the first arch one hundred and nine feet, the distance between the *piers* seventy-two feet and an half; in the second arch the distance of the *piers* is one hundred and thirty feet; in the third the distance is one hundred and nine feet; in the fourth the distance is one hundred and thirty-eight feet. *Arbuthnot.*

PIER, in building, denotes a mass of stone, &c., opposed by way of fortress to the force of the sea, or a river, for the security of ships that lie at harbour in any haven.

PIERS OF A BRIDGE. See BRIDGE.

PIERA, in ancient geography, a fountain of Peloponnesus, between Elis and Olympus. Paus. v. c. 16.

PIERCE, *v. a.* & *v. n.*
PIER'CER, *n. s.*
PIER'CINGLY
PIER'CINGNESS

Fr. *percer;* Lat. *percieo;* Gr. πειρω. To penetrate; enter by force; make way by force; strike; move; affect; affect deeply: a piercer is a borer or instrument which perforates: the adverb and noun substantive correspond with these senses.

There is that speaketh like the *piercing* of a sword; but the tongue of the wise is health. *Proverbs.*

The love of money is the root of all evil; which while some coveted after, they have *pierced* themselves through with many sorrows. 1 *Tim.* vi. 10.

Cart, ladder, and wimble, with *perser* and pod. *Tusser.*

She would not *pierce* further into his meaning, than himself should declare; so would she interpret all his doings to be accomplished in goodness. *Sidney.*

All men knew Nathaniel to be an Israelite; but our Saviour, *piercing* deeper, giveth further testimony of him than men could have done. *Hooker.*

Steed threatens steed in high and boastful neighs,
Piercing the night's dull ear.
Shakspeare. Henry V.

They provide more *piercing* statutes daily to chain up the door. *Shakspeare.*

Her sighs will make a battery in his breast;
Her tears will *pierce* into a marble heart. *Id.*

Say, she be mute, and will not speak a word;
Then I'll commend her volubility;
And say she uttereth *piercing* eloquence. *Id.*

Short arrows, called sprights, without any other heads, save wood sharpened, were discharged out of muskets, and would *pierce* through the sides of ships where a bullet would not *pierce.*
Bacon's Natural History.

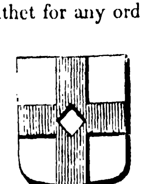
With this fatal sword, on which I died,
I *pierce* her opened back or tender side. *Dryden.*

The hollow instrument, terebra, we may English *piercer*, wherewith many flies are provided, proceeding from the womb, with which they perforate the tegument of leaves, and through the hollow of it inject their eggs into the holes they have made. *Ray.*

The glorious temple shall arise,
And with new lustre *pierce* the neighb'ring skies. *Prior.*

We contemplate the vast reach and compass of our understanding, the prodigious quickness and *piercingness* of its thought.
Derham's Physico-Theology.

PIERCED, in heraldry, an epithet for any ordinary that is pierced, perforated, or struck through, with a hole in it, so as that the field may be seen. The piercing must be particularly expressed, whether it be square, round, or lozenge, as in the annexed figure, a cross lozenge pierced.



PIERCED is also, in marine affairs, an epithet for a ship capable of receiving guns, as, pierced for 100 guns, &c.

PIERIA, in ancient geography, a district of Macedonia, contained between the mouths of the rivers Ludias and Peneus; extended by Strabo beyond the Ludias, to the Axios on the north, and on the south no farther than the Aliacmon, along the west side of the Sinus Thermaicus.

PIERIA of Syria, the north part of Seleucia, on the Antiochena, situated on the Sinus Issicus, and lying next Cilicia on the north-west.

PIERIDES, in fabulous history, the daughters of Pierus, a Macedonian prince, who, presuming

to dispute with the Muses for the prize of poetry, were turned into magpies. They were also called Pæonides.

Pierides, a name of the Muses, from Mount Pieris in Thessaly, which was consecrated to them; or, according to others, from Pierus, a Thessalian poet, who was the first who sacrificed to them. See Pieris.

PIERINO del Vaga, an eminent Italian painter, born of poor parents in Tuscany about the year 1500. He was placed apprentice with a grocer in Florence; but, a painter named Vaga taking him to Rome, he was called Del Vaga, from living with him, his real name being Buonacorsi. After Raphael's death, he joined with Julio Romano and Francis Penni to finish the works in the Vatican, which were left imperfect by their common master; and, to confirm their friendship, married Penni's sister. He gained the highest reputation by his performances in the palace of prince Doria at Genoa; but the multiplicity of his business drained his spirits in the flower of his age; for he died in 1547. Of all Raphael's disciples, Pierino kept the character of his master longest, i. e. his exterior character and manner of designing; for he fell very short of the fineness of Raphael's thinking.

PIERIS, in ancient geography, a mountain which is thought to have given name to Pieria of Macedonia; taking its name from Pierus, a poet, who was the first that sacrificed to the Muses, thence called Pierides.

PIERRE (St. Jaques Henri Bernardin de), was born in 1737 at Havre de Grace, where his parents, who were in easy circumstances, gave him a good education. But he embarked, at the age of twelve years, for Martinique, under the protection of one of his uncles, who commanded a merchant vessel. He soon returned, as he says in one of his letters, 'dissatisfied with his relative, with the sea, and with that island.' He then resumed his studies, and continued them successively at Gisors and at Rouen, under the Jesuits. His parents sent him to Paris to the school of civil engineers. He then entered into a corps of military engineers, and in the following year went to Malta. A quarrel determined him to embark for Holland with the intention of going to Portugal, then at war with Spain; but, an unforeseen obstacle preventing the execution of this design, he offered his services to Peter III. of Russia. He heard of the revolution, which precipitated that unfortunate monarch from the throne at this juncture; nevertheless he pursued his journey, under the idea of finding the empress Catherine at Petersburgh; but on his arrival in that city he learned that she was at Moscow. He accordingly went thither, and obtained a commission as lieutenant in the corps of engineers, which he relinquished at the expiration of eighteen months. He then set out for France by way of Poland. That country was now convulsed by civil wars; he joined the party protected by France, and was taken prisoner by the Russians. Being released in a few days, he resided for some time at Warsaw, then visited Dresden, Berlin, and Vienna, with the intention of entering into the service of some foreign power; but, being unable to make up his mind on the subject, returned to Paris, and sailed for the Isle of France. Here he remained two years; but, the ordinary engineers considering him as an intruder, he quarrelled with them, and solicited and obtained permission to return home. Thus terminated his fruitless peregrinations and military career. At this period he commenced author. In 1773 was published his Voyage to the Isle of France, without his name. The Studies of Nature appeared at the end of 1784, when their author had attained the age of forty-seven years. Like Rousseau, his talents had no dawn, but suddenly burst forth in the full blaze of their splendor; his book was universally read, notwithstanding the well-founded censures of some natural philosophers, whose hostility was roused by his systems; and, in spite of the condemnation of a party, exasperated by his doctrines. The general voice of the public, and the applause of persons of taste, drowned those murmurs; new editions followed in rapid succession; the name of St. Pierre was enrolled among those of the best writers of France, and thenceforward poverty gave place to the comforts of honorable independence. Pensions and rewards now sought the man whom they had formerly shunned. The last lamented monarch of the house of Bourbon spontaneously appointed him intendant of the botanical garden and museum of natural history, with these words, 'I have read your book; it is the production of an honest man; and in you I have provided a worthy successor to M. de Buffon.' Under the Napoleon dynasty he received the cross of the legion of honor; and Joseph Buonaparte bestowed upon him, unsolicited, a pension of 6000 francs. Thus the declining years of St. Pierre were made comfortable; and, as he himself observes, 'his bark, long tossed by the tempest, advanced with propitious gales towards the haven of life.' In the first five years that succeeded the publication of the Studies of Nature, the author was engaged in preparing farther developments of his subject. He arranged his ideas slowly and leisurely; and, gradually disencumbering them of their first dress, at length clothed them in that delicate, picturesque, harmonious, and brilliant language which constitutes the charm of his works. This patient attention to the finishing of his compositions caused him to keep back, for several years, his Paul and Virginia, which he copied over seven or eight times. It was not published till 1789. Nearly at the same period he gave to the world the tale of the Indian Cottage, a production of a different stamp, in which satire was happily blended with that exquisite feeling for the physical and moral beauties of nature which pervades all the works of M. de St. Pierre. The fragments of the Arcadia, which he left unfinished, afforded the means of forming a complete idea of the original talents which he displayed as a painter and a colorist. He left behind him Harmonies of Nature, partly finished; Memoirs of his Life, and a number of irregular dramas, and other sallies of imagination. He died 21st July, 1814.

Pierre (St. Eustace de), a brave French patriot, who devoted his life to save his country, at the celebrated siege of Calais, under our Edward III.

PIERRE (St.), a seaport town of Martinico, in the West Indies, situated at the west coast of the island, five leagues south of Fort Royal. It is a port of entry, and the centre of considerable business. It has been four times burnt down, and contains at present about 2000 houses. The anchorage ground is along the sea-side, on the strand. Another part of the town is separated from this by a river, and the houses are built on a low hill, which is called the fort, from a small fortress which defends the road.

PIERUS, the father of the nine Pierides.

PIERUS, in geography, 1. A mountain of Thessaly sacred to the Muses; 2. A town of Thessaly (Paus. vii. 22); 3. A river of Peloponnesus; 4, 5. A mountain and lake of Macedonia.

PIESTRUM, from πιεζω, to press. In midwifery, an instrument to compress the head of a dead fœtus, for its more easy extraction from the womb.

PIETAS, a deity of the Romans. See PIETY.

PIETISTS, a religious sect among the Protestants of Germany, a kind of mean between the Quakers of England and the Quietists of the Romish church. They despise all sorts of ecclesiastical polity, school theology, and forms and ceremonies, and give themselves up to contemplation and mystic theology. Many gross errors are charged on the Pietists, in a book entitled Manipulus Observationum Antipietisticarum: but they have the air of polemical exaggeration. Indeed there are Pietists of various kinds: some running into gross illusions, and carrying their errors to the overturning of a great part of the Christian doctrine, while others are only visionaries. See *Mosheim's Ecclesiastical History*, vol. iv.

PIETISTS, otherwise called the Brethren and Sisters of the Pious and Christian Schools, a society formed in the year 1678 by Nicholas Barre, and obliged by their engagements to devote themselves to the education of poor children of both sexes.

PIETRO (ST.), the ancient Hieracum, a populous though small island of the Mediterranean, on the south-west coast of Sardinia, near St. Antioco, and ten miles distant from the town of Iglesia, in Sardinia. It is well cultivated; but the inhabitants are chiefly employed in fishing, and making bay-salt. The chief place is Carlo Forte, which has a castle.

PI'ETY, *n. s.* } Fr. *piété*; Ital. *pieta*; Sp.
PI'OUS, *adj.* } *piedad*; Lat. *pietas*, *pius*, qu.
PI'OUSLY, *adv.* } dius à deus, vel à Gr. διος, Cret. θεος, Ainsworth. Devotion; duty to God; godliness; reverence for the Heathen deities; patriotism; duty to parents or seniors: pious and piously follow all these senses.

What *piety*, pity, fortitude did Æneas possess beyond his companions? *Peacham on Poetry.*

I shall never gratify spightfulness with any sinister thoughts of all whom *pious* frauds have seduced. *King Charles.*

The prime act and evidence of the christian hope is, to set industriously and *piously* to the performance of that condition, on which the promise is made. *Hammond.*

As he is not called a just father that educates his children well, but *pious*; so that prince, who defends and well rules his people, is religious. *Taylor's Rule of Living Holy.*

There be who faith prefer and *piety* to God. *Milton.*

Pious awe that feared to have offended. *Id.*

Learn
True patience, and to temper joy with fear
And *pious* sorrow. *Id.*

This martial present *piously* designed,
The loyal city give their best loved king. *Dryden.*

See lion-hearted Richard, with his force
Drawn from the North, to Jury's hallowed plains;
Piously valiant. *Philips.*

Let freedom never perish in your hands!
But *piously* transmit it to your children. *Addison.*

'Till future infancy, baptized by thee,
Grow ripe in years, and old in *piety*. *Prior.*

Where was the martial brother's *pious* care?
Condemned perhaps some foreign shore to tread. *Pope.*

Pope's filial *piety* excels
Whatever Grecian story tells. *Swift.*

Praying for them would make them as glad to see their servants eminent in *piety* as themselves. *Law.*

It would effectually prevent that bad disposition which is too apt to steal upon and infect some of the best human minds (especially those who aim at singular and exalted degrees of *piety*). *Mason.*

True *piety* is cheerful as the day,
Will weep indeed and heave a pitying groan
For others' woes, but smiles upon her own. *Cowper.*

PIETY is the virtue of veneration for the Deity, and love and tenderness to our friends. This distinguished virtue, like many others, received among the Romans divine honors, and was one of their deities. Acilius Glabrio first erected a temple to this divinity, which he did upon the spot on which a woman had fed with her own milk her aged father, who had been imprisoned by order of the senate, and deprived of all aliments. The story is well known. If piety was thus practised and thus honored in Heathen antiquity, it ought not to be less so among Christians, to whom its nature is better defined, and to the practice of which they have motives of greater cogency.

PIETY, Lat. pietas, in allegorical painting and sculpture. Pietas, as the goddess of devotion, is represented as veiled, and casting incense on an altar. The Romans, in their solemn devotions, covered their heads with a long veil.—Ovid, Fast l. iii. v. 364. Lucr. v. v. 1198. The vestal virgins were, therefore, always veiled.

PIEZOMETER. This is an instrument invented by Mr. Perkins for ascertaining the compressibility of water. Having originally filled a cylinder, three feet long and four inches diameter, with water, into which a rod or piston was passed through a stuffing box, and having a sliding ring upon the rod, the whole was lowered 500 fathoms into the sea, when it appeared, by the situation of the sliding ring, that the column of water, which pressed upon the piston, had sunk it so as to have compressed the water one hundredth part of its bulk. The same apparatus was placed in a cannon filled with water, and secured very tight, when a pressure equal to 500 fathoms, was forced in by means of the hydraulic press, and the same results as in the experi-

ment in tne ocean took place. The following is a more detailed account of the instrument he finally employed, abridged from the Philosophisal Transactions, 1820, p. ii.

The end B, see diagram, of a cylinder A, three inches wide and eighteen long, being made water-tight by a plate firmly soldered to it, a cap C, also water-tight, was made to screw on and off. The rod D, $\frac{5}{16}$ of an inch in diameter, and carrying a flexible ring *a*, was made to pass through a tight stuffing box E. A cannon capable of containing the piezometer, was fixed vertically in the earth, the touch-hole being plugged tight, and the muzzle about eighteen inches above ground. A strong cap was then firmly screwed on at the mouth, and in the centre of it a small forcing pump, with a piston five-eighths of an inch in diameter, was tightly screwed. A valve was introduced at a small aperture, to ascertain tne degree of pressure, one pound of pressure on that valve indicating an atmosphere. The piezometer being introduced into the cannon, the water was forced in till the cap showed signs of leakage, the valve at the same time indicating a pressure of 100 atmospheres. When the piezometer was taken out of the cannon, the flexible ring *a* was eight inches up the rod D, which proved that the rod had been forced that length into the cylinder, and that the compression was about one per cent. In order to produce this compression, three per cent. must be pumped into the gun, an effect arising from the expansion of the gun, or the entrance of the water into the pores of the cast-iron. On his voyage to England, Mr. Perkins repeated this experiment frequently, and with the same result, by sinking the piezometer with fifty-four pounds of lead, to the depth of 500 fathoms, which gives nearly a pressure of 100 atmospheres.

Being satisfied that the above piezometer would not show all the compression, he made another, consisting of a small tube, closed at the lower end, and water-tight. At the upper end the water entered through a small aperture, closed by a sensible valve opening inwards. It was then perfectly filled with water (the weight of which was accurately known), and subjected in a hydraulic press to a pressure of about 326 atmospheres. When taken out and weighed, there was found an increase of water amounting to three and a half per cent. This water had been previously boiled, and cooled down 48°, and kept at that temperature during the experiment, which was performed before many scientific individuals. Mr. Perkins made several curious experiments, by sinking strong empty porter bottles to different depths; but we must refer for an account of these to the Philosophical Transactions, as they do not contain any very precise results.

PIG, *n. s.* Sax. pic; Belg. *bigge*. A young sow or boar; an oblong mass of lead or unforged metal, or sodden ore. See Sow.

Some men there are love not a gaping *pig*,
Some that are mad, if they behold a cat.
Shakspeare.

Alba, from the white sow named,
That for her thirty sucking *pigs* was famed.
Dryden.

The flesh-meats of an easy digestion are *pig*, lamb, rabbit, and chicken. *Flower on the Humours.*

A nodding beam, or *pig* of lead,
May hurt the very ablest head. *Pope.*

PIG, in zoology. See SUS.

PIG, GUINEA. See CAVIA.

PIG IRON. See IRON.

PIG OF LEAD, the eighth part of a fother, amounting to 250lbs. weight.

PIGALLE (John Baptist), a celebrated sculptor, born at Paris in 1714. He became chancellor of the academy of painting and knight of St. Michael. He went to Italy, and returned inspired with the genius of the great artists. His most valued works are a Mercury and a Venus, which he made by order of Louis XV., as presents to the king of Prussia. He also carved a statue of Voltaire, with many other admired pieces. He died at Paris in 1785.

PIGANIOL DE LA FORCE, (John Aymar de), a native of Auvergne, of a noble family, who applied himself with ardor to the study of geography, and of the history of France. He also travelled for improvement. His chief works are, 1. An Historical and Geographical Description of France; the largest edition is that of 1753, in 15 vols. 12mo. 2. A Description of Paris, in 10 vols. 12mo.; of which he published an abridgment, in 2 vols. 12mo. 3. A Description of the Castle and Park of Versailles, Marly, &c., in 2 vols. 12mo. Piganiol had also a concern with abbé Nadal in the Journal of Trevoux. He died at Paris in February, 1753, aged eighty. He was as much respected for his manners as for his talents. To a profound and varied knowledge he united a great probity and honor, and all the politeness of a courtier.

PIG'EON, *n. s.* } Fr. *pigeon*; Ital.
PIG'EON-LIVERED, *adj.* } *piccione*, qu. Latin *pipio?* A fowl; the COLUMBA of Linnæus, which see: pigeon-livered means mild, gentle, and sometimes cowardly, or tame, like this bird.

A turtle dove and a young *pigeon*.
Genesis xv. 9.

This fellow picks up wit as *pigeons* peas.
Shakspeare.

I am *pigeonlivered*, and lack gall.
To make oppression bitter. *Id. Hamlet.*

Perceiving that the *pigeon* had lost a piece of her tail, through the next opening of the rocks rowing with all their might, they passed safe, only the end of their poop was bruised. *Raleigh.*

Fixed in the mast, the feathered weapon stands,
The fearful *pigeon* flutters in her bands. *Dryden.*

See the Cupola of St. Paul's covered with both sexes, like the outside of a *pigeon*-house. *Addison.*

This building was designed a model,
Or of a *pigeon*-house or oven,
To bake one loaf, or keep one dove in. *Swift.*

PIGEON, in ornithology, see COLUMBA. The varieties of the common pigeon, enumerated by Linnæus, amount to twenty-one; but those of the pigeon fanciers to more than double that number. The ring-dove (C. palumbus, L.), and

the turtle-dove (C. turtur), with the greater number of the varieties, are cultivated only by a few persons known as pigeon fanciers: but the common pigeon of different colors is cultivated for the table. The flesh of the young is very savory and stimulating, and highly valued for pies; that of the full aged pigeon is more substantial, harder of digestion, and heating. Black or dark feathered pigeons are dark fleshed, and of high flavor, inclining to the game bitter of the wild pigeon. Light colored feathers denote light and delicate flesh. The dung of pigeons is used for tanning upper leathers for shoes; it is also an excellent manure. It is so highly prized in Persia that many pigeon-houses are erected at a distance from habitations for the sole purpose of collecting this manure. They are large round towers, broader at the bottom than at the top, and crowned by conical spiracles through which the pigeons descend. Their interior resembles a honeycomb, forming thousands of holes for nests; and the outsides are painted and ornamented. The dung is applied almost entirely to the rearing of melons, a fruit most rapidly raised in scarce seasons; and hence the reason that during the famine of Samaria a cab of dove's dung was sold for five pieces of silver. (2 Kings vi. 25). The Persians do not eat the bird. Pigeons are now much less cultivated than formerly, being found injurious to corn fields, and especipally to fields of peas. They are, however, very ornamental; a few may be kept by most farmers, and fed with the common poultry, and some who breed domestic fowls on a large scale may, perhaps, find it worth while to add the pigeon to their number. The gray pigeon is most suitable for the common pigeon-house; it generally shows fruitfulness by the redness of the eyes and feet, and by the ring of gold color which is about the neck.

Stocking of pigeon-houses is best performed in May or August, as the birds are then in the best condition. Young birds called squeakers should be chosen, as the old are apt to fly away. The pigeon lays in breeding two white eggs, which produce young ones of different sexes. When the eggs are laid, the female sits fifteen days, not including the three days she is employed in laying, and is relieved at intervals by the male. The turns are generally pretty regular. The female usually sits from about five in the evening till nine the next morning; at which time the male supplies her place, while she is seeking refreshment abroad. Thus they sit alternately till the young are hatched. If the female does not return at the expected time, the male seeks her, and drives her to the nest; and, should he in his turn be neglectful, she retaliates with equal severity. When the young ones are hatched, they only require warmth for the first three days; a task which the female takes entirely upon herself, and never leaves them except for a few minutes to take a little food. After this they are fed about ten days with what the old ones have picked up in the fields, and kept treasured in their crops, whence they satisfy the craving appetite of their young ones, who receive it very greedily. This way of supplying the young with food from the crop, in birds of the pigeon-kind, differs from all others. The pigeon has the largest crop of any bird, for its size; which is also quite peculiar to the kind. In two that were dissected by an eminent anatomist it was found that, upon blowing the air into the windpipe, it distended the crop or gullet to an enormous size. Pigeons live entirely upon grain and water; these, being mixed together in the crop, are digested in proportion as the bird lays in its provisions. Young pigeons are very ravenous, which necessitates the old ones to lay in a more plentiful supply than ordinary, and to give it a sort of half maceration in the crop, to make it fit for their tender stomachs. The numerous glands, assisted by air and the heat of the bird's body, are the necessary apparatus for secreting a sort of pap, or milky fluid (commonly called pigeon's milk), but as the food macerates, it also swells, and the crop is considerably dilated. If the crop were filled with solid substances, the bird could not contract it; but it is obvious the bird has the power to compress its crop at pleasure, and, by discharging the air, can drive the food out also, which is forced up the gullet with great ease. The young usually receives this tribute of affection from the crop three times a day. The male for the most part feeds the young female, and the old female performs the same service for the young male. While the young are weak, the old ones supply them with food macerated suitably to their tender frame; but, as they gain strength, the parents give it less preparation, and at last drive them out, when a craving appetite obliges them to shift for themselves; for, when pigeons have plenty of food, they do not wait for the total dismission of their young; it being a common thing to see young ones fledged, and eggs hatching at the same time and in the same nest. Pigeons are granivorous, and very delicate and cleanly in their diet; they will sometimes eat green aromatic vegetables, but are fondest of seeds; and tares, and the smallest kind of horse-beans, are the most suitable food both in point of economy and fattening qualities.

Pease, wheat, buck-wheat, and even barley oats, &c., are also eaten by pigeons, but old tares may be reckoned their best food, says Mr. Loudon; new tares, pease, or beans, are reckoned scouring. Wherever pigeons are kept, the best way to keep them chiefly at home, and thereby both prevent their being lost and their doing injury to corn-crops, is to feed them well; this is also the only way in which, in modern times, they will afford abundance of fat and delicate squabs for the table, which, well fed, they will do every month in the year, and thus afford a constant supply of delicate stimulating food. Pigeons are generally fed in the open air adjoining their cote or house; but in inclement weather, or to attach new pigeons to their home, both food and water should be given alternately. That this may be done without waste, and without frequently disturbing the birds, two contrivances are in use; the first is the meat-box or hopper, whence grain or pulse descends from the hopper as eaten out of a small shallow box; the next is the water-bottle, an ovate, long, naked bottle, reversed in a small basin to which

it serves as a reservoir. Any bottle will do, but the pigeons are apt to alight on and dirty such as when reversed present a flat top. Pigeons being fond of salt, what is called a pigeon-cat is often placed in the midst of the pigeon-house, or in the open air near it. It seems these birds are fond of salt and hot substances, and constantly swallow small stones to promote digestion. The salt-cat is thus composed: gravel or drift-sand, unctuous loam, the rubbish of an old wall, or lime, a gallon of each; should lime be substituted for rubbish, a less quantity of the former will suffice; one pound of cummin-seed, one handful of bay-salt; mix with stale urine. Enclose this in jars, corked or stopped, holes being punched in the sides, to admit the beaks of the pigeons. These may be placed abroad. They are very fond of this mixture, and it prevents them from pecking the mortar from the roofs of their houses, which they are otherwise very apt to do. Cleanliness is one of the first and most important considerations in a dovecote.

They are of three kinds, small boarded cases fixed on posts, trees, or against the ends of houses: lofts fitted up with holes or nests; and detached buildings. 'The first are generally too small to contain a sufficient brood, and are also too subject to variations of temperature; and the last, on the other hand, are now-a-days too large, and therefore the most suitable for the farmer is a loft or tower rising from a building in which no noisy operation is carried on. The lofts of any of the farm-buildings at a distance from the threshing-machine are suitable, or a loft or tower over any detached building will answer well; but the best situation of all is a tower raised from the range of poultry-buildings, where there is such a range, as the pigeons can thus be more conveniently treated, and will feed very readily with domestic poultry. For a tower of this sort, the round form should be preferred to the square; because the rats cannot so easily come at them in the former as in the latter. It is also much more commodious; as, by means of a ladder turning round upon an axis, it is possible to visit all the nests in the house, without the least difficulty; which cannot be so easily done in a house of the square form. And in order to hinder rats from climbing up the outside of it, the wall should be covered with tin-plates to a certain height, as about a foot and a half; which should project out three or four inches at the top, to prevent more effectually their getting up. A common mode in France is to raise a boarded room on a strong post, powerfully braced, the interior sides of which are lined with boxes for the birds, and the exterior east and west sides with balconies, or sills for them to alight on and enter to their boxes. The north and south sides are lined with boxes inside, but without openings, as being too cold on the one front, and too warm on the other. The interior must be lined with nests or holes, subdivided either by stone, as in the ancient mural pigeon-houses; by boards; or each nest composed of a vase or vessel of earthenware fixed on its side. Horizontal shelves divided vertically at three feet distance, are generally esteemed preferable to every other mode.

Pigeons are protected by the legislature. By the 1 James, c. 27, whosoever shall shoot at, kill, or destroy, any dove or pigeon, with any gun or bow, or take, kill, or destroy the same with setting dogs or nets, or any snares, engines, or instruments whatsoever, shall, on being convicted before two justices, by confession, or oath of two witnesses, be commited to gaol for three months, or pay for the use of the poor 20*s*. for every pigeon; or, after this commitment become bound by recognizance, with two sureties, before two justices, in £20 each, not to offend in like manner again. And by the 2 Geo. III. c. 29, any person who shall shoot at, or by any means kill or take, with a wilful intent to destroy, any pigeon, he shall on conviction thereof, by confession, or oath of one witness, before one justice, forfeit 20*s*. to the prosecutor; and, if not immediately paid, such justice shall commit him to the house of correction, for any term not exceeding three months, nor less than one, unless the penalty be sooner paid. Persons who are convicted on this act shall not be convicted by any former act, and prosecutions on this act must be commenced within two months after the offence was committed. These two abstracts are given to inform the keepers of pigeons of the laws in force to protect them; but more especially to remove the vulgar error, so prevalent among the lower class of people, that pigeons are a nuisance, that they destroy a great deal of seed in the fields, grain in the rick-yards, and loosen the tiles on the tops of buildings; and that any person may shoot them, provided that he does not carry them away.

Pigeon (Peter Charles Francis), curate and afterwards rector or vicar of Bayeux, one of the numberless victims who fell a sacrifice to Jacobin rage and infidelity, in the beginning of the French revolution. Although a man of not only sincere piety, but of uncommon mildness and humanity, yet, because he refused to take the oaths imposed by the republicans, he and his family were at first insulted and persecuted in the cruellest manner, and he himself was at last murdered on the 20th of August, 1793, in his thirty-eighth year.

Pigeon Pea. See Cytisus.

Pigeon Foot is a species of geranium.

PIGHIUS (Stephen Vinand), a learned antiquary, born at Campen in Overyssel, in 1520. He went to Rome, and was patronised by cardinal Granvelle, who made him his librarian. The learned are indebted to him for the first good edition of Valerius Maximus, in 1585, 8vo. He became preceptor to prince Charles of Juliers, who dying, he wrote a panegyric upon him, on which his father, prince William, made him canon of Santen, where he died in 1604, aged eighty-four. His Annales, seu Fasti Romanorum Magistratuum et Provinciarum, were published by Schottus in 1615, in 3 vols. folio.

PIGHT, old preter. and part. pass. of pitch. See Pitch.

PIG'MENT, *n. s.* Lat. *pigmentum.* Paint; color to be laid on any body.

Consider about the opacity of the corpuscles of black *pigments*, and the comparative diaphaneity of white bodies. *Boyle.*

PIGMENTUM, from *pingo*, to paint, pigment. This name is given by anatomists to a mucous substance found in the eye, which is of two kinds. The pigment of the iris is that which covers the anterior and posterior surface of the iris, and gives the beautiful variety of color in the eyes. The pigment of the choroid membrane is a black or brownish mucus, which covers the anterior surface of the choroid membrane, contiguous to the retina and the anterior surface of the ciliary processes.

PIGMY, *n. s.* Fr. *pigmée*; Lat. *pygmæus*; Gr. πυγμαιος. A small nation, fabled to be devoured by the cranes; thence any thing mean or inconsiderable.

Of so low a stature, that, in relation to the other, they appear as *pigmies*. *Heylin.*

When cranes invade, his little sword and shield
The *pigmy* takes. *Dryden's Juvenal.*

The criticks of a more exalted taste, may discover such beauties in the ancient poetry, as may escape the comprehension of us *pigmies* of a more limited genius. *Garth.*

But that it wanted room,
It might have been a *pigmy's* tomb. *Swift.*

PIGNEAUX (N.), late bishop of Audran, was born in the department of the Aisne, in France, 1740. He went in 1770, with the authority of the pope, as a missionary to Cochin China, and gained the esteem of the king, Caung-Schung, who confided to him the education of his only son. The troubles which disturbed the empire of his protector, obliged him to fly to the town of Sat-Gond, whence he proposed invoking the assistance of France. The king had been surprised by three ambitious brothers, who overthrew his empire and forced him to seek an asylum in the isle of Pulo-Wa. In 1787 the bishop departed for France, taking his pupil with him, and formed an offensive and defensive league between France and Cochin China, returning with the title of ambassador extraordinary to that kingdom. Before his arrival in Cochin China, the Revolution broke out, and all help was refused him. Still he did not lose his courage, but, going to the isle of Pula-Wa, brought thence Caung-Schung, who, profiting by the discontent of his subjects, regained his empire in 1790. He now created Pigneaux his first minister, and under his direction founded several manufactories. The bishop translated for him a Treatise on Tactics, instituted schools, to which fathers of families were obliged to send their children at the age of four years, and died in 1800, when Caung-Schung caused him to be interred with the highest funeral honors of the Cochin-Chinese.

PIGNORIUS (Lawrence), a learned Italian, born at Padua in 1571, and bred an ecclesiastic. He made deep researches into antiquity, and published several curious works in Italian and Latin, particularly Mensa Isiaca, on the antiquities of Egypt. The great Galileo procured him the offer of a professorship at Pisa, but he declined it. In 1630 he was made a canon in Treviso, but died of the plague in 1631.

PIG'NUT, *n. s.* Pig and nut. An earth nut.

I with my long nails will dig thee *pignuts*.
Shakspeare.

PIGS'NEY, *n. s.* Sax. piga, a girl. A word of endearment to a girl. It is used by Butler for the eye of a woman, 'I believe,' says Johnson, improperly.'

Shine upon me but benignly
With that one, and that other *pigsney*.
Hudibras.

PIGUS, in ichthyology, a species of leather-mouthed fish, very much resembling the common carp; being of the same shape and size, and its eyes, fins, and fleshy palate, exactly the same; from the gills to the tail there is a crooked dotted line; the back and sides are bluish, and the belly reddish. It is covered with large scales, from the middle of each of which there rises a fine pellucid prickle, which is very sharp. It is an excellent fish for the table, being perhaps preferable to the carp: and it is in season in the months of March and April. It is caught in lakes in some parts of Italy, and is mentioned by Pliny, though without a name. Artedi says it is a species of cyprinus, and he styles it the cyprinus called piclo and pigus.

PIGWIDGEON, *n. s.* Used by Drayton as the name of a fairy, and is a kind of cant word for any thing petty or small.

Where is the Stoick can his wrath appease,
To see his country sick of Pym's disease;
By Scotch invasion to be made a prey
To such *pigwidgeon* myrmidons as they?
Cleaveland.

PI-HAHIROTH, a mouth or narrow pass between two mountains, called Chiroth or Eiroth, and lying not far from the bottom of the west coast of the Arabian Gulph; before which the children of Israel encamped, just before their entering the Red Sea.

PIISSKER, in ichthyology, is a fish of the mustela kind, commonly called the fossil mustela, or fossil fish. They are generally found as long as a man's hand is broad, and as thick as one's finger; but they sometimes grow much longer: the back is gray with a number of spots and traverse streaks, partly black and partly blue; the belly is yellow, and spotted with red, white, and black; the white are the larger, the others look as if they were made with the point of a needle; and there is on each side a longitudinal black and white line. There are some fleshy excrescences at the mouth, which are expanded in swimming, but contracted when out of the water. These fishes run into caverns of the earth, in the sides of rivers, in marshy places, and penetrate a great way, and are often dug up at a distance from waters. Often, when the waters of brooks and rivers swell beyond their banks, and again cover them, they make their way out of the earth into the water; and, when it deserts them, they are often left in vast numbers upon the ground, and become a prey to swine. It is thought to be much of the same kind with the fisgum fish; and it is indeed possible that the pæcilia of Schonefeldt is the same.

PIKE, *n. s.* Fr. *picque*, 'his snout being sharp.' Skinner and Junius. The popular name of the esox lucius.

The luce or *pike* is the tyrant of the fresh waters: Sir Francis Bacon observes the *pike* to be the longest lived of any fresh water fish, and yet he computes it

to be not usually above forty years; and others think it to be not above ten years; he is a solitary, melancholy, and bold fish; he breeds but once a year, and his time of breeding or spawning is usually about the end of February, or somewhat later, in March, as the weather proves colder or warmer: and his manner of breeding is thus: a he and a she *pike* will usually go together out of a river into some ditch or creek, and there the spawner casts her eggs, and the melter hovers over her all the time she is casting her spawn, but touches her not. *Walton's Angler.*

In a pond into which were put several fish and two *pikes*, upon drawing it some years afterwards there were left no fish, but the *pikes* grown to a prodigious size, having devoured the other fish and their numerous spawn. *Hale.*

The *pike* the tyrant of the floods. *Pope.*

PIKE, *n. s.* ⎫ Sax. þiic: Goth. *piki* (a
PI'KED, *adj.* ⎬ pointed stick or pole); Teut.
PIKE'MAN, *n. s.* ⎬ *picke*; Belg. *pick*; Fr. *pique.*
PIKE'STAFF. ⎭ A lance; a long pointed weapon; a fork used in husbandry; a pitchfork (which may have one or more points): piked is sharp, acuminated: a pike man is a soldier who is armed with a lance or pike: pikestaff, the pole or handle of a pike.

A rake for to rake up the fitches that lie,
A *pike* to *pike* them up handsome to drie. *Tusser.*

Three great squadrons of *pikemen* were placed against the enemy. *Knolles's History of the Turks.*

Beat you the drum that it speak mournfully,
Trail your steel *pikes.* *Shakspeare. Coriolanus.*

Let us revenge this with our *pikes*, ere we become rakes; for I speak this in hunger for bread, not for revenge. *Shakspeare.*

—Why then I suck my teeth, and catechise
My *piked* man of countries. *Id. King John.*

They closed, and locked shoulder and shoulder, their *pikes* they strained in both hands and therewith their buckler in the left, the one end of the *pike* against the right foot, the other breast-high against the enemy. *Hayward.*

A lance he bore with iron *pike*;
The one half would thrust, the other strike.
Hudibras.

Hard wood, prepared for the lathe with rasping, they pitch between the *pikes.* *Moxon.*

To me it is as plain as a *pikestaff*, from what mixture it is, that this daughter silently lowers, t'other steals a kind look. *Tatler.*

PIKE, in war, an offensive weapon, consisting of a wooden shaft, twelve or fourteen feet long, with a flat steel head pointed, called the spear. This weapon was long in use among the infantry; but now the bayonet, which is fixed on the muzzle of the firelock, is substituted in its stead.

PIKE, in ichthyology. See ESOX. The pike never swims in shoals as most other fishes do, but always lies alone; and is so bold and ravenous that he will seize upon almost any thing less than himself. Instances of the voracity of these fishes are so numerous and well known that it is unnecessary to quote them. They breed but once a year, in March. They are found in almost all fresh waters; but very different in goodness, according to the nature of the places where they live. The finest pike are found in clear rivers; those in ponds and meres are inferior, and the worst are those of the fen ditches. They are very plentiful in these last places, where the water is foul and colored; and their food, such as frogs and the like, plentiful but coarse; so that they grow large, but are yellowish and high bellied, and differ greatly from those which live in clearer waters. The fishermen have two principal ways of catching pikes, by the ledger, and the walking bait. The ledger bait is fixed in one certain place, and may continue while the angler is absent. This must be a live bait, a fish or frog: and, among fish, the dace, roach, or gudgeon, are the best; of frogs, the only caution is to choose the largest and yellowest that can be met with. If the bait be a fish, the hook is to be stuck through the upper lip, and the line must be fourteen yards at least in length; the other end of this is to be tied to a bough of a tree, or to a stick driven into the ground near the pike's haunt, and all the line wound round a forked stick except about half a yard. The bait will by these means keep playing so much under water, that the pike will soon lay hold of it. If the bait be a frog, then the arming wire of the hook should be put in at the mouth, and out at the side; and, with a needle and some strong silk, the hind leg of one side is to be fastened by one stitch to the wire arming of the hook. The pike will soon seize this, and must have line enough to give him leave to get to his haunt and poach the bait. The trolling for pike is a pleasant method also of taking them: in this a dead bait serves, and none is so proper as a gudgeon. This is to be pulled about in the water till the pike seizes it; and then he is to have line enough, and time to swallow it: the hook is small for this sport, and has a smooth piece of lead fixed at its end to sink the bait; and the line is very long, and runs through a ring at the end of the rod, which must not be too slender at top. The art of feeding pikes, to make them fat, is by giving them eels; otherwise perches, while small, and their prickly fins tender, are the best food for them. Breams put into a pike-pond are a very proper food: they will breed freely, and their young ones make excellent food for the pike. The numerous shoals of roaches and ruds which are continually changing place, and often in floods get into the pike's quarters, afford food for them for a long time. Pikes, when used to be fed by hand, will come up to the very shore, and take the food that is given them out of the fingers of the feeder. It is wonderful to see with what courage they will do this, after a while; and it is very diverting when there are several of them nearly of the same size, to see what striving and fighting there will be for the best bits that are thrown in. The most convenient place is near the mouth of the pond, and where there is about half a yard depth of water; for, thus, the offal of the feedings will all lie in one place, and the deep water will serve for a place to retire into and rest in, and will be always clean and in order.

PILA (Lat. from Gr. πιλω, compressed wool), in archaiology, a little image of a man made of wool, and sacrificed by the ancients to the household gods, or lares, in the fetes instituted in honor of those inferior deities by Servius, and styled compitales. Macrobius states that actual infants were originally offered up for this purpose; but on the expulsion of the kings from

Rome that barbarous custom was abolished, and the pila substituted in place of the child. This appellation was likewise given to a figure made of straw, which they presented to the bulls in the amphitheatre for the purpose of exciting them; as also to a species of standard upon which were represented several shields piled upon one another. Titus Livius calls the pillar in the forum, from which Horace had suspended the spoils of the Curiatii, Pila Horatia.

Pila, in antiquity, was a ball variously made according to the different games in which it was to be used. Playing at ball was very common among the Romans of the first distinction, and was looked upon as a manly exercise, which contributed both to amusement and health. The pila was of four sorts: 1. Follis or balloon; 2. Pila Trigonalis; 3. Pila pagonica; 4. Harpastum. All these come under the general name of pila.

Pila Marina, or the sea ball, in natural history, a substance very common on the shores of the Mediterranean, and elsewhere. It is generally found in the form of a ball about the size of the balls of horse-dung, and composed of a variety of fibrillæ irregularly complicated. Various conjectures have been given of its origin by different authors. Bauhine tells us that it consists of small hairy fibres and straws, such as are found about the sea plant called alga vitriariorum; but he does not ascertain to what plant it owes its origin. Imperatus imagined it consisted of the exuviæ both of vegetable and animal bodies. Mercatus is doubtful whether it be a congeries of the fibrillæ of plants, wound up into a ball by the motion of the sea-water, or whether it be not the workmanship of some sort of beetle living about the sea shore, and analogous to our common dung beetle's ball, which it elaborates from dung for the reception of its progeny. Schreckius says it is composed of the filaments of some plant of the reed kind: and Welchius supposes it is composed of the pappous part of the flowers of the reed. Klein, who had thoroughly and minutely examined the bodies themselves, and also what authors had conjectured concerning them, thinks that they are wholly owing to, and entirely composed of, the capillaments which the leaves, growing to the woody stalk of the alga vitriariorum, have when they wither and decay. These leaves, in their natural state, are as thick as a wheat straw, and they are placed so thickly about the tops and extremities of the stalks, that they enfold, embrace, and lie over one another; and from the middle of these clusters of leaves, and indeed from the woody substance of the plant itself, there arise several other very long, flat, smooth, and brittle leaves. There are usually four from each tuft of the other leaves; and they have ever a common vagina, which is membranaceous and very thin. This is the style of the plant, and the pila marina appears to be a cluster of the fibres of the leaves of this plant, which cover the whole stalk, divided into their constituent fibres; and by the motion of the waves first broken and worn into short shreds, and afterwards wound up together into a roundish or longish ball.—Klein. de Tab. Marin. p. 22.

PILANI, Roman soldiers who were armed with a sort of spontoon, the iron of which was thick and long, called pilum.

PILASTER, *n. s.* Fr. *pilastre;* Ital. *pilastro.* A square column sometimes insulated, but oftener set for the greater part within a wall.

Pilasters must not be too tall and slender, lest they resemble pillars; nor too dwarfish and gross, lest they imitate the piles or piers of bridges. *Wotton.*

Built like a temple, where *pilasters* round
Were set. *Milton.*

The curtain rises, and a new frontispiece is seen, joined to the great *pilasters* each side of the stage. *Dryden.*

Clap four slices of *pilaster* on't,
That laid with bits of rustic makes a front. *Pope.*

Pilaster, Fr. *pilastre,* in architecture, a square pillar or column, usually placed against a wall, and projecting not more than one-fifth or one-sixth of its thickness. It has the same proportions and ornaments as a column, varying according to the different orders of architecture, but no diminution. The pilasters in a building should be of the same order as the columns, if any of the latter are used.

It would be incorrect to attribute the invention of pilasters to mere imitation of the column, inasmuch as the motive for their use is chiefly to give strength to the building, and the desire to render these props ornamental occasioned the ancient architects to apply to them the graces of adornment and proportion. See Architecture.

PILATE (Pontius), was governor of Judea when our Lord was crucified. Of his family or country we know but little, though it is believed that he was of Rome, or at least of Italy. He was sent to govern Judea in the room of Gratus, A. D. 26 or 27, and governed this province for ten years, from the twelfth or thirteenth year of Tiberius to the twenty-second or twenty-third. He is represented, both by Philo and Josephus, as a man of an impetuous and obstinate temper, as a judge who used to sell justice, and to pronounce any sentence that was desired, provided he was paid for it. They likewise speak of his rapines, murders, oppressions, and the torments that he inflicted upon the innocent, and the persons he put to death without any form of process. Philo, in particular, describes him as having exercised excessive cruelty during his whole government, disturbed the repose of Judea, and given occasion to the troubles and revolt that followed. St. Luke records his massacre of the Galileans in the temple (xiii. 1, 2, &c.), Justin Martyr, Tertullian, Eusebius, and after them several others, both ancient and modern, assure us that it was formerly the custom for Roman magistrates to prepare copies of all verbal processes and judicial acts which they passed in their several provinces, and to send them to the emperor. And Pilate, having accordingly sent word to Tiberius of what had passed relating to Jesus Christ, the emperor wrote an account of it to the senate, in a manner that gave reason to judge that he thought favorably of the religion of Jesus Christ, and showed that he would be willing they should decree divine honors to him. But, fortunately, the senate was not of the same opinion, and so the matter was

dropped. It appears, by what Justin says of these acts, that the miracles of Jesus Christ were mentioned in them; and that the soldiers had divided his garments among them. Eusebius insinuates that they spoke of his resurrection and ascension. Neither Eusebius nor St. Jerome, however, nor any other author that wrote afterwards, seem to have seen them, at least not the true and original acts; for, as to what we have now in great numbers, they are not authentic. There are also letters of Pilate to Tiberius extant, giving a history of our Saviour; but they are universally allowed to be spurious. Pilate having, by his excessive cruelties and rapine, disturbed the peace of Judea during the whole time of his government, was at length deposed by Vitellius, the proconsul of Syria, A.D. 36, and sent to Rome to give an account of his conduct to the emperor. Tiberius having died before he arrived at Rome, his successor, Caligula, banished him to Vienne in Gaul, where he was reduced to such extremity that he killed himself. He was only procurator of Judea, though the evangelists call him governor, because he in effect acted as one, by taking upon him to judge in criminal matters. See Calmet's Dictionary, and Beausobre's Annotations. With regard to Pilate's wife, the general tradition is that she was named Claudia Procula, or Proscula; and, as to her dream, some think that as she had intelligence of our Lord's apprehension, and knew by his character that he was a righteous person, her imagination, struck with these ideas, naturally produced the dream we read of; but others think that this dream was sent miraculously, for the clearer manifestation of our Lord's innocence.

PILATRE DU ROSIER (Francis), was born at Metz the 30th of March, 1756. He was first apprentice to an apothecary there, and afterwards went to Paris in quest of improvement. He applied himself to the study of natural history and of natural philosophy, and had already acquired some reputation when the discovery of M. Montgolfier had just astonished the learned world. On the 25th October, 1783, he attempted an aërial voyage with the marquis of Arlande. He performed several other excursions in this way with success, in the presence of the royal family of France, of the king of Sweden, and of Prince Henry of Prussia. He then resolved to pass into England by means of his aërial vehicle, and for that purpose repaired to Boulogne, whence he rose about seven o'clock in the morning of the 15th of June, 1785; but, in half an hour after he set out, the balloon took fire, and the aëronaut, with his companion M. Romaine, was seriously injured by the fall. Pilatre's social virtues and courage, which were very distinguished, heightened the regret of his friends for his loss. His merit as a chemist, and his experiments as an aëronaut, procured him some pecuniary rewards, and some public appointments. He had a pension from the king, was intendant of Monsieur's cabinets of natural philosophy, chemistry, and natural history, professor of natural philosophy, a member of several academies, and principal director of Monsieur's museum.

PILAYA Y PASPAYA, or CINTI, a province of Peru, forty leagues south of La Plata, and bounded on the north by Tomina and Pomabamba, on the east by the Chiriguanos Indians, and on the west and south by Porco and Chichas. Its length is about thirty leagues, and its width forty. Intersected in all directions by the Cordillera, the climate in the valleys is moderately hot, and the soil very productive: the grapes of the district are made into wine and brandies, which are much esteemed. The San Juan, which rises in Lipes, pervades this country: the Toropalca and Cinti also fertilise the valleys through which they run; and the Supas and Agchilla form, by their united streams, the Paspaya, which divides the province from Pomabamba, and runs into the Pilcomayo. The towns of Pilaya and Paspaya were, not many years since, destroyed by the incursions of the Indians from the east; but there are some abundant lead-mines in the settlement of Pototaca. Inhabitants about 12,000.

PILCHARD, or PILCHER, in ichthyology, a fish which has a general likeness to the herring, but differs in some particulars very essentially. The body is less compressed than that of the herring, being thicker and rounder: the nose is shorter in proportion, and turns up; the under jaw is shorter. The back is more elevated; the belly less sharp. The dorsal fin of the pilchard is placed exactly in the centre of gravity, so that when taken up by it, the body preserves an equilibrium, whereas that of the herring dips at the head. The scales of the pilchard adhere very closely, whereas those of the herring very easily drop off. The pilchard is in general less than the herring, but is fatter, or more full of oil. Pilchards appear in vast shoals off the Cornish coasts about the middle of July, disappearing the beginning of winter, yet sometimes a few return after Christmas. Their winter retreat is the same with that of the herring, and their motives for migrating the same. See CLUPEA. They affect, during summer, a warmer latitude; for they are not found in any quantities on any of our coasts, except those of Cornwall, that is to say, from Fowey Harbour to the Scilly Isles, between which places the shoals keep shifting for some weeks. The approach of pilchards is known by the same signs as those that indicate the arrival of the herrings. Persons, called in Cornwall huers, are placed on the cliffs, to point to the boats stationed off the land the course of the fish. By the 1st of James I., c. 23, fishermen are empowered to go on the grounds of others to hue, without being liable to actions of trespass, which before occasioned frequent law-suits. Enormous multitudes of these fish are taken on the coast of Devonshire as well as Cornwall, between the months of July and September inclusive, when the whole line of coast presents a scene of bustle and activity. The fish for foreign export and winter consumption are laid upon shore in large stacks or piles, with layers of salt between each row; here they are suffered to lie for twenty or thirty days, during which time a vast discharge of pickle mixed with blood and oil takes place, all of which is carefully caught in pits and preserved for manure, which is eagerly purchased by the farmer and carried away in casks. It is

said that every pilchard will dress and richly manure one square foot of ground. The fish are then carefully washed with sea water, dried and packed in hogsheads, in which state they are sent abroad. The average value of pilchards taken in one year in Cornwall is supposed to be from £50,000 to £60,000. See our article Fisheries.

PIL'CHER, *n. s.* Sax. þylche. Warburton says we should read pilche, in Shakspeare, see below, which signifies a cloke or coat of skins (meaning the scabbard): this is confirmed by Junius, who renders pilly a garment of skins; Fr. *pellice;* Ital. *pelliccia;* Lat. *pellis.* A gown, or case. It is used for a child's garment, provincially, to this day.

Pluck your sword out of his *pilcher* by the ears. *Shakspeare.*

PILCOMAYO, a large river, formerly of Peru, now included in the viceroyalty of Buenos Ayres, province of Charcas. It falls into the Paraguay on the left, by two branches, on the point of land formed by the most northern of which, the city of Assumption was founded by Gonzales de Mendoza, in 1538. The other branch joins the Paraguay within a short distance of the confluence of the Vermejo. It is the largest river of the Gran Chaco, and is one of the most important of the branches of the Paraguay, forming a water communication of nearly 900 miles, with the province of Los Charcos, and the mines of Potosi. It is said that, owing to the quantity of quicksilver washed into the river from the mountains, no fish will live in it. In 1740 a failure of its waters is recorded, even at its source, by which the working of the mines of Potosi was suspended.

PILE, *n. s.* & *v. a.* Sax. þıl; Belg. *pyle;* Fr. *pile;* Lat. *pila.* A piece of timber used as a buttress or prop. See below. Hence a building; heap; accumulation; any thing heaped to be burned; to heap or accumulate.

Woe to the bloody city, I will even make the *pile* for fire great. *Ezekiel* xxiv. 9.

The bridge the Turks before broke, by plucking up of certain *piles*, and taking away of the planks. *Knolles.*

What *piles* of wealth hath he accumulated
To his own portion! what expence by the hour
Seems to flow from him! how, i' the name of thrift,
Does he rake this together? *Shakspeare.*

I'll bear your logs the while; pray give me it,
I'll carry 't to the *pile.* *Id. Tempest.*

The fabrick of his folly, whose foundation
Is *piled* upon his faith, and will continue
The standing of his body. *Id. Winter's Tale.*

Attabaliba had a great house *piled* upon the sides with great wedges of gold. *Abbot.*

Not to look back so far, to whom this isle
Owes the first glory of so brave a *pile.* *Denham.*

The ascending *pile* stood fixed her stately height. *Milton.*

Our noblest *piles* and stateliest rooms
Are but outhouses to our tombs;
Cities, tho' e'er so great and brave,
But mere warehouses to the grave. *Butler.*

The *pile* o'erlooked the town, and drew the sight. *Dryden.*

Against beleagured heaven the giants move;
Hills *piled* on hills, on mountains mountains lie,
To make their mad approaches to the sky. *Id.*

The foundation of the church of Harlem is supported by wooden *piles*, as the houses in Amsterdam are. *Locke.*

If the ground be hollow or weak, he strengthens it by driving in *piles.* *Moxon.*

Men *piled* on men, with active leaps arise,
And build the breathing fabrick to the skies. *Addison.*

The wife, and counsellor or priest,
Prepare and light his funeral fire,
And chearful on the *pile* expire. *Prior.*

In Alexander's time, the Indian philosophers, when weary of living, lay down upon their funeral *pile* without any visible concern. *Collier.*

By the water passing through the stone to its perpendicular intervals, was brought thither all the metallic matter now lodged therein, as well as that which lies only in an undigested and confused *pile.* *Woodward.*

In all that heap of quotations which he has *piled* up, nothing is aimed at. *Atterbury.*

All these together are the foundation of all those heaps of comments, which are *piled* so high upon authors, that it is difficult sometimes to clear the text from the rubbish. *Felton.*

Fancy brings the vanished *piles* to view,
And builds the imaginary Rome anew. *Pope.*

No longer shall forsaken Thames
Lament his old Whitehall in flames;
A *pile* shall from its ashes rise,
Fit to invade or prop the skies.
Swift's Miscellanies.

The whole performance is not so much a regular fabric, as a heap of shining materials thrown together by accident, which strikes rather with the solemn magnificence of a stupendous ruin, than the elegant grandeur of a finished *pile.* *Johnson.*

Pile, *n. s.* Lat. *pilus.* A hair; hairy surface. Obsolete.

Yonder's my lord, with a patch of velvet on's face: his left cheek is a cheek of two *pile* and a half, but his right cheek is worn bare. *Shakspeare.*

Many other sorts of stones are regularly figured; the amianthus of parallel threads, as in the *pile* of v lvet. *Grew.*

Pile, *n. s.* Lat. *pilum.* The head of an arrow.

His spear a bent,
The *pile* was of a horse fly's tongue,
Whose sharpness nought reversed.
Drayton.

Whom, on his haire-plumed helmet's crest, the dart first smote, then ran
Into his forehead, and there stuck the steele *pile* making way
Quite through his skull. *Chapman.*

Pile, *n. s.* Fr. *pile;* Ital. *pila.* One side of a coin; the reverse of cross.

Other men have been, and are of the same opinion, a man may more justifiably throw up cross and *pile* for his opinions, than take them up so. *Locke.*

Pile, in artillery, implies a collection or heap of shot or shells, piled up by horizontal courses into either a pyramidal or else a wedge-like form, the base being an equilateral triangle, a square, or a rectangle. In the triangle and square, the pile terminates in a single ball or point, and forms a pyramid; but, with the rectangular base, it finishes at top, in a row of balls, or an edge forming a wedge.

In the triangular and square piles the number of horizontal rows, or courses, or the number

counted on one of the angles from the bottom to the top, is always equal to the number counted on one side, in the bottom row. And, in rectangular piles, the number of rows or courses is equal to the number of balls in the breadth of the bottom row, or shorter side of the base; also, in this case, the number in the top row or edge is one more than the difference between the length and breadth of the base.

To PILE ARMS, to place three muskets, with or without fixed bayonets, in such a relative position that the butts shall remain firm upon the ground, and the muzzles be close together in an oblique direction. This method has been adopted to prevent the injury which was formerly done to musketry, when the practice of grounding the firelock prevailed. Every recruit should be taught how to pile arms before he is dismissed the drill.

PILE, among the Greeks and Romans, was a pyramid built, whereon were laid the bodies of the deceased to be burnt. It was partly in the form of an altar, and differed in height according to the quality of the person to be consumed. Probably it might originally be considered as an altar, on which the dead were consumed as a burnt offering to the infernal deities. The trees made use of in the erection of a funeral pile were such as abounded in pitch or resin, as being most combustible; if they used any other wood, it was split that it might the more easily catch fire. Round the pile were placed cypress boughs, to hinder the noisome smell. See FUNERAL.

PILE, in coinage, denotes a kind of puncheon, which, in the old way of coining with the hammer, contained the arms or other figure and inscription to be struck on the coin. See COINAGE. Accordingly we still call the arms side of a piece of money the pile, and the head the cross; because, in ancient coin, a cross usually took the place of the head in ours.

PILE, in heraldry, an ordinary in form of a wedge, which is borne commonly, as in fig. 1. Sometimes the pile is borne wavy, as fig. 2. He

Fig. 1.

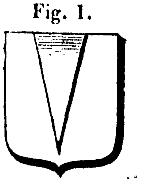


Fig. 2.

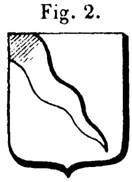
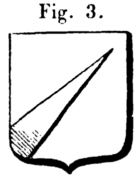


Fig. 3.



beareth azure a pile wavy issuing out of the dexter corner. Sometimes inverted, as fig. 3.

PILE WORMS are a kind of worms found in the piles of the sea dikes in Holland. They are of very various sizes; for some of the young ones are not above an inch or two in length, while others have been found thirteen or fourteen inches long. The heads of these creatures are covered with two hard shells or hemicrania; which, together, form a figure resembling an auger, and with which they bore the wood. The best remedy against them is to perforate the pile with many small holes about an inch asunder; then it must be done over with a varnish in the hottest sun; and, while the varnish is hot, brick dust must be strewed over it; and, this being several times repeated, the pile will be covered with a strong crust, absolutely impenetrable to all insects. See Philosophical Transactions, No. 455, sect. 5.

PIL'EATED, *adj.* Lat. *pileus.* Having the form of a cover or hat.

A *pileated* echinus taken up with different shells of several kinds. *Woodward on Fossils.*

PILES, *n. s.* Lat. *pilulæ.* Used only in the plural. The hæmorrhoids.

Wherever there is any uneasiness, solicit the humours towards that part, to procure the *piles,* which seldom miss to relieve the head. *Arbuthnot.*

PILES. See MEDICINE, Index.

PILES, in the architecture of bridges and other works connected with deep water, are beams or stakes of wood, driven firmly into the ground, for various purposes; as for forming the foundation for piers, buildings, &c. A large portion of some cities, as for instance Amsterdam, is wholly built upon piles, but they are not ordinarily employed for foundations unless the ground be unsound, or when the weight to be borne is very great. When they are to be driven quite below ground, small straight trees are often used without squaring; but, for the outside work of coffer-dams, square piles are always used. When they are to touch each other, flat ones, called pile planks, of three or four inches thick, are used, according to the depth of water, and have grooves formed in their edges, to receive tongues or slips of wood which make the joints tight.

Two rows of piles are first driven one within the other, at a distance proportionate to the depth and force of the water they are driven in. The space between is filled with clay, so as to form a mound or rampart, defended outside and inside by the piles. Different machines have been used to drive the piles; some worked by a number of men, who raise a heavy weight a small height, and let it fall upon the pile, others by horses and wheelwork. A very simple machine is often employed. A long thick plank of wood, being fixed up close to the pile, has a mortise through the upper end, in which a pulley is fitted; a rope goes over this to suspend the rammer, which is a large block of hard wood, properly hooped: in rising and falling it slides against the face of the plank, and is guided by irons, which are fixed to the ram, and are bent round the edges of the plank in the manner of hooks. The plank, when placed upright, is secured by guy ropes, in the manner of a ship's mast, the end of the great rope which suspends the ram has ten or twelve small ropes spliced into it, for as many men to take hold, and work it by; they raise the ram up by pulling the ropes altogether, and then letting them go, the ram falls upon the pile. When the latter becomes firm enough to cause the ram to rebound, they take care to pull the ropes instantly after the blow, that they may avail themselves of the rebound. Other machines instead of a plank have two upright beams attached, at such a distance asunder as to leave an opening for the reception of a piece of wood which is affixed to the ram, and by this means it is guided. Piles are chiefly used for making the faces of wharfs,

banks of rivers, piers in or against the sea, &c. For these purposes they are driven in rows, rather in an inclined position, and support the planking or framing fixed against them. For defence against the water, in laying the foundation of bridges, &c., piles are almost always required, and are employed to form a water-tight enclosure, called a coffer-dam, from which space the water is drawn by pumps, and the pier laid within it. This, the most difficult of all kinds of piling, must stand a good height above the ground, and yet have sufficient strength to resist the pressure of the water. The piles used are in general of square tapering timber, cut to a point at one end, and shod with iron; the other end being bound by iron hooping to prevent the pile head splitting.

A machine of this kind, with a beech ram four feet long and one foot square, may be worked by ten or twelve men, at the rate of twenty-four blows per minute. To estimate the force of the rammer, multiply its weight into the velocity it acquires in falling. Thus, if a rammer which weighs 500lbs. be let fall from four feet, it will fall that height in half a second, and have at the time of percussion a velocity capable to carry it uniformly eight feet in half a second, without any further help from gravity; so that we must multiply 500 by 16, or its weight by the number of feet it would fall in a second, and the product 8000 gives the momentum of the stroke. If pulleys, or a windlass, be made to raise the rammer to a height, and then, by an easy contrivance, loosen it at once, the momentum of the stroke will always be as the square root of the height.

In the bridges and other large works of modern times, a very heavy iron ram has been raised to a considerable height, and then let fall. The machine is worked both by horses and steam-engines: see fig. 1. plate PILE-DRIVING. A, A, are the uprights, erected on the frame B, and supported by the braces they are connected by the cross-feet *a* at bottom, and the piece D at top; in this the pulley *b* for the rope *d* is fitted. Fillets of iron are fixed withinside the uprights A, A, and enter grooves made in the edges of the great iron ram E, which is thereby guided as it rises and falls: F is a piece called the follower, a wooden block, sliding between the uprights, and mortised to receive the iron tongs *e*, which take hold of an eye upon the top of the cast iron ram: the rope is attached to the follower by an iron loop *f*, through which the centre pin of the tongs passes. On the base, *a* B, of the machine an iron frame is bolted, to contain the windlass G, on which the rope *d* winds. On the end of the windlass a cog-wheel, is fixed, and a pinion upon the axis, *h*, engages its teeth. Motion is given to the spindle *h* by the winches *k*, fixed on each end of it; and the fly-wheel, *l*, regulates its motion, when turned by two men at each handle. The pile is included in the space between the two uprights, A, A, before it is driven down; and the ram, being engaged by the tongs *e*, is drawn up by turning the handle *k*, till the tails, *n*, of the tongs come to the inclined planes *m*: by these they are closed together, which opens the lower ends, disengages them from the eye of the ram, and it falls upon the head of the pile immediately. The men at the handles shift the spindle *h* endways, which disunites the pinion from the wheel, and then the weight of the follower, F, runs back the windlass G, and descends till its tongs take hold of the ram, ready to take it up again. The inclined planes, *m*, are not fixed to the uprights A, A, but are connected together by pieces of wood, which embrace the uprights, and these have holes through them to receive iron bolts, which also pass through the uprights. By this means the inclined planes can be shifted, to set them at any required height, that they may, by discharging the ram at the proper height, give a blow proportioned to the pile which is to be driven by it. The tongs are made sometimes with rollers in the ends, as in fig. 2, that they may act more easily in the inclined planes. Other machines have a kind of latch, shown in fig. 3, instead of the tongs; in this *f* represents the iron loop for the rope; the centre pin of it passes through the latch *r s t*, which catches the eye of the ram by the hook *t*, and is discharged by the line *r*, when the men snatch it. The weight *s* is to cause the hook to catch; the loop *f* is attached to a wooden follower, which guides it. When machines of this kind are moved by steam-engines, a pulley, fixed on the end of the spindle *h*, in place of the handle *k*, receives an endless rope from some wheel put in motion by the engine; one man then attends it, to throw the spindle endways at the proper time, to permit the descent of the follower; or levers and a connecting rod from the inclined plane are used to disengage the spindle the moment after the follower discharges the ram.

The piles at Westminster bridge were driven by an ingenious machine invented by Mr. Voloue, and worked with horses. They were afterwards cut off, under water, by a machine, so as to be level with the surface of the ground to found the piers upon. This last machine consisted of a framing fitted upon the upper part of the pile, and could be fixed fast thereto. The lower part of it formed guides for the saw, which reciprocated horizontally at a certain depth beneath the top of the pile, and had weights to cause it to advance up to the cut.* The saw was put in motion by ropes from each end, which were conducted over pulleys, to two men standing on a float or raft at the surface. After fixing the machine, before the sawing was begun, the whole was suspended by a tackle, which therefore took up the top part of the pile with the machine as soon as it was cut off. This was the invention of Mr. Etheridge, carpenter to the works; it was very effective, as the time employed in cutting off a fir pile of fourteen or sixteen inches square, in ten feet depth of water, was seldom more, and often less, than a minute and a half.

A similar but somewhat more convenient machine has been since invented by Mr. Foulds, for which the Society of Arts presented him their gold medal. See figs. 4 and 6: A A B is the external frame, consisting of four parallel rays A, framed into two others B, at right angles, with proper cross pieces to unite them, and inclined to strengthen the whole; within this frame a

second, or internal frame, D E, is situated; like the other, it has four parallel pieces, D and E, connected together into one frame by cross pieces; at the top it has two pieces *a*, *a*, which rest upon the beam B, and suspend its weight, and on these it is capable of sliding backwards and forwards between B B, always preserving its parallelism, because it is moved by the racks, *d*, *d*, affixed to it, one at top and the other at the bottom; the pinions for both are fixed on a vertical axis *e*, supported by the external frame; therefore, by turning the handle *r*, the internal frame with the saw is advanced to the pile, as at K, fig. 5. The saw itself is sustained in a frame L, fig. 6, which fits, in the manner of a sash frame, between the two beams, D, of the internal frame, and has racks, *f*, *f*, (dotted) behind it, which work in pinions on an axis *g*, fig. 5, extended across the frame, and by the handle, *y*, of this it is capable of being drawn up and let down, or detained at any height by a ratchet-wheel and click *x*; the saw, *m*, is fixed upon a spindle N, supported in bearings on the frame L, and turned by the handle, R, at the top; the saw is connected with the spindle by a piece of iron *p*, having a mortise through it for the reception of the spindle, to which it is fastened by a nut beneath: by this means the saw's edge may be advanced as the work goes on.

In using this machine, the beams, B, are fixed across a barge, which is ballasted till they are horizontal, and the spindle of the saw is therefore vertical in this state; it is moored with her side against the pile, K, to be cut off, as shown by the dotted line V, fig. 5; then, by the rack and pinion *f g*, the saw is adjusted in height to the level where the pile is to be cut; by the handle *r* it is advanced to the pile K, whilst by the other handle, R, the saw is kept in continual motion backwards and forwards, till the pile is cut through, and the piece is taken into the barge, which proceeds to cut off the next by the same means. By this machine temporary piles may be cut off level with the bottom, when the work is finished, which is a superior method to drawing them up out of the ground, as is the usual practice, because this must necessarily make a deep ditch or trench all round the pier or foundation. To draw piles out of the ground, when they have been driven fast also requires a great force. At Waterloo bridge the useless piles were drawn, we believe, by one of Mr. Bramah's hydrostatic cylinders, which one or two men could manage so as to draw the largest pile.

PILES (Roger de), a learned French writer, born at Clamecy, of a good family, in 1635. He studied at Nevers and Auxerre; then went to Paris for philosophy, and studied divinity in the Sorbonne. Meantime he cultivated painting under Recollet. In 1652 he became preceptor to the son of M. Amelot, whom he accompanied into Italy, and on his return became famous as a connoisseur. In 1682, M. Amelot being sent on an embassy to Venice, De Piles attended him as secretary; and, during his residence there, he was sent by the marquis of Louvois into Germany, to purchase pictures for Louis XIV., and likewise to execute a private commission on state affairs. In 1685 he attended M. Amelot to Lisbon, and in 1689 to Switzerland, as secretary. In 1692 he was sent incognito to Holland, as a virtuoso, but in reality to act as a spy. Being detected, he was put in prison, where he continued till the peace of Ryswick, and where he wrote his Lives of the painters. In 1705, though in his seventieth year, he attended M. Amelot on his embassy into Madrid. He died in 1709. His other works are, 1. An Abridgment of Anatomy; 2. A Translation of Fresnoy; 3. Dialogues on Painting; 4. A Dissertation on the Works of famous Painters; 5. Elements of Painting. All in French.

PILEUS, Lat., from Gr. πιλιδιον, a hair-cap, in the archaiology of costume, a hat, cap, or bonnet to cover the head. Plaut. Stat. The Roman pileus was not much unlike our night-cap, or rather our seaman's cap. On several ancient Greek vases we find sundry heroes of antiquity invested with the πιλιδιον, and more especially the figures of Ulysses, perhaps by way of indicating his long and frequent voyages. According to Eustathius it was Apollodorus, the master of Zeuxis, who first decorated Ulysses thus. At the commencement of the republic the Romans were much in the habit of going about with the head uncovered, or covered but with a piece of their vestment; they wore the pileus only during public games, at the time of the saturnalia, or in voyages. It was likewise used as an emblem of liberty; and in this sense was applied to slaves about to be enfranchised. Servum ad Pileum vocare (Livy), was to give him his freedom, which they did by first shaving his head, then putting a cap upon it.

PILEUS THESSALICUS, a broad-brimmed bonnet for the purpose of shielding the wearer either from sun or rain. It took its name from the Thessalonians, who first adopted it.

PILEUS PANNONICUS was a sort of military bonnet made of skin.

PILEWORT, the ranunculus ficaria of Linnæus, is a very small plant, found in moist meadows, and by hedge sides. The roots consist of slender fibres, with some little tubercles among them which are supposed to resemble the hæmorrhoids. Thence it has been concluded that this root must needs be of wonderful efficacy for the cure of that distemper; to the taste it is little other than mucilaginous; and, although still retained in several of the foreign pharmacopœias, it is hardly used in this country.

PIL'FER, *v. a.* & *v. n.*
PIL'FERER, *n. s.*
PIL'FERY.
} Fr. *piller*, *pilfier*. To steal; gain by petty theft; practise petty robbery: pilfery is petty theft.

> Your purposed low correction
> Is such as basest and the meanest wretches,
> For *pilf'rings* and most common trespasses,
> Are punished with. *Shakspeare. King Lear.*

He would not *pilfer* the victory; and the defeat was easy. *Bacon.*

They not only steal from each other, but *pilfer* away all things that they can from such strangers as do land. *Abbot.*

> I came not here on such a trivial toy
> As a stray'd ewe, or to pursue the stealth
> Of *pilfering* wolf. *Milton.*

Ev'ry string is told,
For fear some *pilf'ring* hand should make too bold.
Dryden.

When these plagiaries come to be stripped of their *pilfered* ornaments, there's the daw of the fable. *L'Estrange.*

A wolf charges the fox with a piece of *pilfery*; the fox denies, and the ape tries the cause. *Id.*

Hast thou suffered at any time by vagabonds and *pilferers*? Promote those charities which remove such pests of society into prisons and workhouses. *Atterbury's Sermons.*

Triumphant leaders, at an army's head,
Hemm'd round with glories, *pilfer* cloth or bread,
As meanly plunder as they bravely fought. *Pope.*

To glory some advance a lying claim,
Thieves of renown, and *pilferers* of fame.
Young.

PIL'GRIM, *n. s.* Belg. *pelgrim*; Teut. *pilgram*; Fr. *pelerin*; Ital. *pelegrino*; Lat. *peregrinus.* A traveller; a wanderer; particularly one who travels on a religious account.

Befell that in that seson on a day
In Southwerk at the Tabberd as I lay,
Redy to wendin on my *pilgrimage*
To Canterbury, with devote corage,
At night wer come into that hostery
Wele nine and twenty in a cumpany
Of sundrie folk.
Chaucer. Prologue to Canterbury Tales.

In prison thou hast spent a *pilgrimage*,
And, like a hermit, overpast thy days.
Shakspeare.

We are like two men
That vow a long and weary *pilgrimage*. *Id.*

Most miserable hour that time ere saw
In lasting labour of his *pilgrimage*. *Id.*

Granting they could not tell Abraham's footstep from an ordinary *pilgrim's*; yet they should know some difference between the foot of a man and the face of Venus. *Stillingfleet.*

Painting is a long *pilgrimage*; if we do not actually begin the journey, and travel at a round rate, we shall never arrive at the end of it. *Dryden.*

Like *pilgrims* to the' appointed place we tend;
The world's an inn, and death the journey's end.
Id.

The ambulo hath no certain home or diet, but *pilgrims* up and down every where, feeding upon all sorts of plants. *Grew.*

Two *pilgrims*, which have wandered some miles together, have a heart's grief when they are near to part. *Drummond.*

Books of this sort, or sacred, or profane,
Which virtue helped, were titled not amiss
'The medicine of the mind:' who read them, read
Wisdom, and was refreshed; and on his path
Of *pilgrimage*, with healthier step advanced.
Pollok.

PILGRIMAGE is a kind of religious discipline, which consists in taking a journey to some supposed holy place. Pilgrimages began to be made about the middle ages of the church; but they were most in vogue after the end of the eleventh century, when every one was for visiting places of devotion, not excepting kings and princes; and even bishops made no difficulty of being absent from their churches on the same account. The places most visited were Jerusalem, Rome, Compostella, and Tours. In 1428, in the reign of Henry VI., many licenses were granted to captains of English ships, for carrying devout persons to the shrine of St. James of Compostella, in Spain; provided that those pilgrims should first swear 'not to take any thing prejudicial to England, nor to reveal any of its secrets, nor to carry out with them any more gold or silver than what would be sufficient for their reasonable expenses.' In this year there went out thither the following number of persons:—from London 280, Bristol 200, Weymouth 122, Dartmouth ninety, Yarmouth sixty, Jersey sixty, Plymouth forty, Exeter thirty, Liverpool twenty-four, Ipswich twenty; in all 926 pilgrims. For the pilgrimages of the followers of Mahomet see MAHOMETANISM.

In every country where popery was established pilgrimages were common; and in those countries which are still popish they continue. In England the shrine of St. Thomas à Becket was the chief resort of the pious, and in Scotland St. Andrew's; where, as tradition stated, was deposited a leg of the holy apostle. In Ireland they still continue, and the number of holy wells, and miraculous cures, &c., produced by them is said to be great.

PILKINGTON (Lætitia), a famous authoress, daughter of Dr. Van Lewin, a physician of Dublin, where she was born in 1712. She was married very young to the reverend Matthew Pilkington, a poet of considerable merit; and these two wits, as is often the case, lived very unhappily together. They were at length totally separated, on the husband discovering a gentleman in her bedchamber at two o'clock in the morning. After this unlucky adventure, Mrs. Pilkington came to London, and having recourse to her pen for subsistence, through the means of Colley Cibber, she lived some time on the contributions of the great. She was, however, thrown into the Marshalsea for debt; until, being set at liberty, she opened a pamphlet shop. At length she raised a handsome subscription for her Memoirs; which are written with great sprightliness and wit, containing several entertaining anecdotes of dean Swift, with whom she was intimate. This ingenious, but unhappy woman, is said at last to have killed herself with drinking, at Dublin, in 1750.

PILL, *n. s.* Fr. *pillule*; Lat. *pilula.* Medicine made into a small ball or mass.

When I was sick you gave me bitter *pills*.
Shakspeare.

In the taking of a potion or *pills*, the head and the neck shake. *Bacon's Natural History.*

The oraculous doctor's mystick bills,
Certain hard words made into *pills*. *Crashaw.*

That wheel of fops; that santer of the town
Call it diversion, and the *pill* goes down. *Young.*

PILL, *v. a.* French *piller*. To rob; plunder. Obsolete.

So did he good to none, to many ill;
So did he all the kingdom rob and *pill*.
Spenser.

The commons hath he *pill'd* with grievous taxes,
And lost their hearts. *Shakspeare. Richard II.*

He who *pill'd* his province, 'scapes the laws,
And keeps his money, though he lost his cause.
Dryden.

Suppose *pilling* and polling officers, as busy upon the people, as those flies were upon the fox.
L'Estrange.

PILL, *v. n.* Corrupted of peel. To be stript away; to come off in flakes or scoriæ.

Jacob took him rods of green poplar, and *pilled* white strakes in them. *Genesis* xxx. 37.
The whiteness *pilled* away from his eyes. *Tobit.*

PIL'LAGE, *n. s.* & *v. a.* } French *pillage.* PIL'LAGER, *n. s.* } Plunder; something obtained by plunder: to rob; plunder; spoil.

Others, like soldiers,
Make boot upon the summer's velvet buds;
Which *pillage* they with merry march bring home.
Shakspeare.

Jove's seed the *pillager*
Stood close before, and slackt the force the arrow did confer. *Chapman.*

The consul Mummius, after having beaten their army, took, *pillaged,* and burnt their city. *Arbuthnot.*

But she with such delicate skill
Her *pillage* so fits for her use,
That the chemist in vain with his still
Would labour the like to produce. *Cowper.*

PIL'LAR, *n. s.* Fr. *pilier;* Span. *pilar;* Welsh and Arm. *piler.* A column; supporter; maintainer. See PILE.

Note, and you shall see in him
The triple *pillar* of the world transformed
Into a strumpet's stool.
Shakspeare. Antony and Cleopatra.

I charge you by the law,
Whereof you are a well deserving *pillar,*
Proceed to judgment. *Id. Merchant of Venice.*

Pillars or columns, I could distinguish into simple and compounded. *Wotton's Architecture.*

If this fail,
The *pillared* firmament is rottenness,
And earth's base built on stubble. *Milton.*

The palace built by Picus vast and proud,
Supported by a hundred *pillars* stood. *Dryden.*

The' infuriate hill shoots forth the *pillared* flame.
Thomson.

PILLAR, in the manege, is the centre of the ring, or manege ground, round which a horse turns, whether there be a pillar in it or not. Besides this, there are pillars on the circumference or sides of the manege ground, placed at certain distances, by two and two, whence they are called the two pillars, to distinguish them from that of the centre. The use of the pillar in the centre is for regulating the extent of ground, that the manege upon the volts may be performed with method and justness, and that they may work in a square by rule and measure, upon the four lines of the volts; and also to break unruly high-mettled horses, without endangering the rider. The two pillars are placed at the distance of two or three paces one from the other; and the horse is put between those, to teach him to rise before, and yerk out behind, and put himself upon raised airs, &c., either by the aids or chastisements.

PILLAR, POMPEY'S. See ALEXANDRIA.

PILLARS, in antiquarian topography, are large single stones set up perpendicularly. Those which are found in this country have been principally the work of the Druids; or, as they are the most simple of all monuments, are probably more ancient than druidism itself. They were placed as memorials recording different events; such as remarkable instances of God's mercies, contracts, singular victories, boundaries, and sometimes sepulchres. Various instances of these monuments erected by the patriarchs occur in the Old Testament: such was that raised by Jacob at Luz, afterwards by him named Bethel; such, also, was the pillar placed by him over the grave of Rachael. They were likewise marks of execrations and magical talismans. These stones, from having been long considered as objects of veneration, at length were, by the ignorant and superstitious, idolatrously worshipped. After the introduction of Christianity, therefore, some had crosses cut on them, which was considered as snatching them from the service of the devil.

PILLAU, a well-built old sea-port of East Prussia, between the Baltic and the long maritime inlet called the Frische Haff. It is important chiefly for its harbour, its population being under 3000. Adjoining to the town is a regular fortress, considered the key to this part of Prussia. The harbour, which serves as the port of Konigsberg, is commodious, but has only twelve feet of water. It has a good sturgeon fishery, and the number of vessels amounts to several hundreds annually. The peninsula on the point of which it stands is a pleasant and fertile track, and near the fort is a fine plain, where the Frische Haff forms a semicircular bay, on the other side of which stands Alt or Old Pillau, consisting of two fishing villages. Twenty-two miles W.S.W. of Konigsberg.

PILLIBEET, a town in the province of Delhi, Hindostan, district of Bareilly, thirty-three miles north-east from Bareilly. During the Rohillah government this was an emporium of commerce, and was greatly augmented by Hafez Rehmut, who built a spacious pettah here four miles in circumference. Its staples are saul, sissoo, and fir timbers, sugars, and coarse cloths; and from the mountains of Almora are imported borax, pitch, drugs, wax, and honey. After its acquisition by the Nabob of Oude its commerce was annihilated; but, since its cession to the British, it has greatly revived.

PIL'LION, *n. s.* From pillow; or Lat. *pulvinus.* A soft saddle for a woman.

I thought that the manner had been Irish, as also the furniture of his horse, his shank *pillion* without stirrups. *Spenser.*

The horse and *pillion* both were gone;
Phyllis, it seems, was fled with John. *Swift.*

PIL'LORY, *n. s.* Fr. *pillori;* barb. Lat. *pillorium.* A frame made with holes and moveable boards, through which the heads and hands of criminals were put. See below.

I have stood in the *pillory* for the geese he hath killed. *Shakspeare.*

God uses not the rod where he means to use the sword. The *pillory* or scourge is for those malefactors, which shall escape execution. *Bp. Hall.*

To be burnt in the hand or *pilloried* is a more lasting reproach than to be scourged or confined.
Government of the Tongue.

As thick as eggs at Ward in *pillory.* *Pope.*

The jeers of a theatre, the *pillory,* and the whipping-post, are very near a-kin.
Watts on the Mind.

An opera, like a *pillory,* may be said
To nail our ears down, but expose our head.
Young.

PILLORY, in law, collistrigium, q. d. collum stringens; pilloria: from the Fr. pilleur, i. e. depeculator, or pelori; derived from the Gr. πυηλ, janua, a door, because one standing on the pillory puts his head as it were through the door, and ορaω, to see: is an engine made of wood to punish offenders, by exposing them to public view, and rendering them infamous. There is a statute of the pillory, 51 Hen. III. And by statute it was appointed for bakers, forestallers, and those who use false weights, perjury, forgery, &c. 3 Inst. 219. Lords of leets were to have a pillory and timbrel, or it will be the cause of forfeiture of the leet; and a village may be bound by prescription to provide a pillory, &c. 2 Hawk. P. C. 73. But, by stat. 56 Geo. III. c. 138, the punishment of pillory is abolished in all cases except perjury, and in all cases where the punishment of the pillory has hitherto formed the whole or part of the judgment, the court may pass sentence of fine and imprisonment, or both, in lieu of the pillory. So that this punishment is virtually abolished altogether.

PIL'LOW, *n. s.* } Sax. pyle; Swed. *pil;* Teut. PIL'LOWCASE. } *pole;* Belg. *puluwe.* A bag of down or feathers laid under the head to sleep on; any cushion: the case explains itself.

One turf shall serve as *pillow* for us both,
One heart, one bed, two bosoms, and one troth.
Shakspeare.

A merchant died that was very far in debt, his goods and household stuff were set forth to sale; a stranger would needs buy a *pillow* there, saying, this *pillow* sure is good to sleep on, since he could sleep on it that owed so many debts. *Bacon.*

Thy melted maid,
Corrupted by thy lover's gold,
His letter at thy *pillow* laid. *Donne*

When the sun in bed,
Curtain'd with cloudy red,
Pillows his chin upon an orient wave
The flocking shadows pale,
Troop to the' infernal jail. *Milton.*

Their feathers serve to stuff our beds and *pillows*, yielding us soft and warm lodging.
Ray on the Creation.

When you put a clean *pillowcase* on your lady's *pillow*, fasten it well with pins. *Swift.*

Yon cottager, who weaves at her own door,
Pillow and bobbins all her little store;
Content though mean, and cheerful if not gay,
Shuffling her threads about the livelong day,
Just earns a scanty pittance, and at night
Lies down secure, her heart and pocket light.
Cowper.

PILNITZ, a town of Upper Saxony, memorable for the treaty entered into between the emperor of Germany, the king of Prussia, and other princes of Europe, against France, in 1792. It lies seven miles south-east of Dresden.

PILON (Frederick), an Irish dramatic writer, born at Cork in 1750. He was sent to Edinburgh to study medicine, but the stage soon withdrew his attention from physic. He made his appearance on the Edinburgh theatre in the character of Oroonoko, and continued to act on the provincial theatres for four years, till 1776, when he went to London; where he published a Critical Essay on Hamlet, which procured him the patronage of Mr. Coleman. In 1776 he wrote the Drama, a poem, in the manner of Churchill's Rosciad; and Regatta, a poem on the fete given on the Thames in 1776, both of which were well received. After various other miscellaneous pieces, he published, in 1778, The Invasion, or a Trip to Brighthelmstone, a comedy, which was acted with applause at Covent Garden. After this, his Fair American, an opera, was refused by the manager of Covent Garden; and, though acted at Drury Lane, produced a dispute with the manager, and much more trouble than profit to the author. His next comedy was He would be a Soldier, the profits of which to him were much inferior to what might have been expected; and, being distressed by creditors, he went to France, where he wrote The Ward of Chancery, but had not finished it completely when he returned to England, and died at Lambeth, January, 1788.

PILOS'ITY, *n. s.* Lat. *pilosus.* Hairiness.

At the years of puberty, all effects of heat do then come on, as *pilosity*, more roughness in the skin.
Bacon.

PI'LOT, *n. s.* } Fr. *pilote;* Ital. and Span. PI'LOTAGE. } *piloto;* Dan. Port. and Dut. *piloot.* He whose office it is to steer a ship; the skill of a pilot or his wages.

We must for ever abandon the Indies, and lose all our knowledge and *pilotage* of that part of the world.
Raleigh.

When her keel ploughs hell,
And deck knocks heaven, then to manage her,
Becomes the name and office of a *pilot.*
Ben Jonson.

To death I with such joy resort,
As seamen from a tempest to their port;
Yet to that port ourselves we must not force,
Before our *pilot*, nature, steers our course.
Denham.

What port can such a *pilot* find,
Who in the night of fate must blindly steer?
Dryden.

The Roman fleet, although built by shipwrights, and conducted by *pilots* without experience, defeated that of the Carthaginians. *Arbuthnot on Coins.*

PILOT, in a general sense, implies a person properly qualified and licensed to conduct ships on or near the sea-coast, or through intricate channels, and into the roads, bays, rivers, &c., within his respective district. They are not constant standing officers on board our ships, but are called in occasionally, on coasts or shores unknown to the master: and, having piloted the vessel, they return to the shore where they reside. After a pilot is taken on board a merchant ship, the master has no longer any command of her till she is safe in harbour; but then the master resumes the government, and is to see her bed and lying; the pilot being no longer liable, though for his own convenience he may still be on board. The same rule holds good if a pilot goes on board only to conduct a ship through some dangerous place, as for instance Yarmouth Roads; after passing them the master must resume the command, and the pilot is no longer responsible.

The regulations with regard to pilots in the royal navy are as follow:—The commanders of the king's ships, in order to give all reasonable encouragement to so useful a body of men as pilots, and to remove all their objections to his

majesty's service, are strictly charged to treat them with good usage, and an equal respect with warrant officers. The purser of the ship is always to have a set of bedding provided on board for the pilots, and the captain is to order the boatswain to supply them with hammocks, and a convenient place to lie in near their duty, and apart from the common men; which bedding and hammocks are to be returned when the pilots leave the ship.

A pilot, when conducting one of his majesty's ships in pilot-water, shall have the sole charge and command of the ship, and may give orders for steering, setting, trimming, or furling the sails, tacking the ship, or whatever concerns the navigation; and the captain is to take care that all the officers and crew obey his orders. But the captain is diligently to observe the conduct of the pilot, and take particular care that the hand-lead be kept constantly going, whether the pilot think this precaution necessary or not; and if he judge him unqualified to conduct the ship, or that he is carrying her into danger, he may remove him from the command and charge of the ship, and take such methods for her preservation as shall be judged necessary; remarking upon the log book the exact hour and time when the pilot was removed from his office, and the reasons assigned for it.

Captains of his majesty's ships which are to sail from the river Thames or the Nore are to apply to the commissioners of the navy for pilots, and are to employ those only who shall be sent them by the Trinity House of Deptford Stroud; but captains of ships which are to sail from the Downs to the Nore or the Thames are to employ pilots belonging to the society of pilots at Dover. The captain of a king's ship employing a pilot in a foreign part of his majesty's dominions shall give him three certificates of the services he performs (to be marked respectively first, second, and third) of the same tenor and date; which being produced to the proper naval officer, he shall cause the same to be immediately paid; but, if there be no naval officer there, the captain shall pay him, and send the proper vouchers, with his bill, to the navy board, in order to be paid as bills of exchange.

Captains of his majesty's ships, employing foreign pilots to carry the ships they command into or out of foreign ports, shall pay them the rates due by the establishment or custom of the country, before they discharge them; whose receipts being duly vouched, and sent with a certificate of the service performed to the navy board, they shall cause them to be paid with the same exactness as they do bills of exchange.

The owners of hired ships, cutters, and other armed vessels, are, by their contracts, to provide for them masters who have been accustomed to sail in ships and vessels of this description; it is therefore incumbent upon the latter to take charge of them upon all ordinary cases of cruising or pilotage, where it is not usual for a king's ship to employ a pilot extra; and it has been deemed advisable, in order to prevent any unnecessary expense to the public on this account, to require, as indispensable to the payment of certificates for pilotage of hired vessels, that they be approved by the commander-in-chief or commanding officer on the station; or that his order for the employment of the pilot is produced.

If any person shall take upon him to conduct or pilot a ship by or from Dover, Deal, or the Isle of Thanet, to any place on the river Thames or Medway, before he has been *examined* by the master and wardens of the society or fellowship of pilots of the Trinity House of Dover, Deal, and the Isle of Thanet, touching his ability; and approved and admitted into the said society, at a court of load-manage, by the lord warden of the cinque ports or his deputy, and the master and wardens; such person, for the first offence, shall forfeit £10, for the second £20, and for every other offence £40, &c. 3 Geo. I. c. 13, sec. 1. This act shall not hinder any person from assisting a ship in distress.—Sec. 7. Nor shall it extend to the taking away any liberties vested in the corporation of the Trinity House of Deptford Stroud.—Sec. 9.

If any person shall take charge of any ship as pilot, down the river of Thames, or through the North Channel, to or by Orfordness, or round the Long-Sand-Head into the Downs, or down the South Channel into the Downs, or from or by Orfordness upon the North Channel, or the river Medway, other than such as should be *licensed* to act as a pilot, by the master, wardens, and assistants of the Trinity House of Deptford Stroud, under the common seal of the corporation; every person so offending, and being convicted before two justices of the peace for the city of London, or the counties of Middlesex, Essex, Kent, or Surrey, shall, for every offence, forfeit £20, provided that nothing in this act shall extend to the obliging any master of any ship in the coal trade or coasting trade to employ a pilot. 5 Geo. II. c. 20, sec. 1.

In case any pilot shall refuse to take the charge of any of his majesty's ships when appointed thereto by the said corporation, or shall have misbehaved himself in the conduct of any ships, or in any other part of his duty; or if pilots shall refuse to obey any summons of the corporation, or such orders as the corporation shall make in the premises, the general court of the said corporation, upon examination thereof, are required to recal the warrants granted to such pilots; and if such persons shall (after notice given by the clerk of the said corporation to them in person, or left at their place of abode) act as pilots within the limits afore-mentioned, they shall be subject to all the penalties inflicted on unlicensed pilots.—Sec. 9. Yet nothing in this act shall extend to the impeaching of any privileges enjoyed by the pilots of the Trinity House of Kingston-upon-Hull, or the Trinity House of Newcastle-upon-Tyne.—Sec. 11. Nor shall this act extend to the impeaching of the franchises, nor to take away the sole right of piloting merchant-ships from or by Dover, Deal, or the Isle of Thanet, upon the river of Thames or Medway, granted to the society and fellowship of the master, wardens, and pilots of the Trinity House of Dover, Deal, and the Isle of Thanet, by 3 Geo. I. c. 13, sec. 12.

If any pilot shall negligently lose the ship

under his care, and be therefore convicted, he shall for ever be incapacitated from acting as a pilot.

PILOT, BRANCH, is a pilot duly authorised by the Trinity Board to pilot ships up particular channels and rivers. They have regular wages from the Trinity House Company.

PILOT FISH, or gasterosteus ductor, in ichthyology, is a species of the gasterosteus, and is found in the Mediterranean and in the Atlantic Ocean, chiefly towards the equator. Catesby, who gives a figure of it in its natural size, together with a short description, calls it perca marina secteria, or rudder-fish. One of them, which Gronovius describes, was about four inches long, and its greatest breadth little more than an inch: the head is about a third of the body, and covered, excepting the space between the snout and the eye, with scales scarcely perceptible, and covering one another like tiles; the iris of the eye is a silver gray; the jaws are of equal size, and furnished as well as the palate with small teeth disposed in groups; there is also a longitudinal row of teeth on the tongue. The trunk of the pilot-fish is oblong, a little rounded; but it appears quadrangular towards the tail, because at this place the lines are thicker, and form a kind of membranaceous projection. The back fin is long, and furnished with seven radii; on the fore part of this fin are three moveable prickles very short; the fins on the breast have each of them twenty radii, forked at their extremity; the abdominal fins have six; that of the anus has seventeen branches, of which the first is longest; this fin is preceded by a small moveable prickle; that of the tail is thick, large, and forked. The pilot-fish is of a brownish color, changing into gold; a transversal black belt crosses the head; the second passes over the body at the place of the breast; a third near the moveable prickles of the back; three others near the region of the anus; and a seventh at the tail. Seafaring people observe that this fish frequently accompanies their vessels; and, as they see it generally towards the fore part of the ship, they imagined that it was guiding and tracing out the course of the vessel, and hence it received the name of pilot-fish. Osbec tells us that they are shaped like those mackarels which have a transversal line across the body. 'Sailors,' continues he, 'give them the name of pilots, because they closely follow the dog-fish, swimming in great shoals round it on all sides. It is thought that they point out some prey to the dog-fish. See Mem. of the Swed. Acad. for 1755, vol. xvi. p. 71. It likewise follows the shark apparently for the remains of its prey. Barbut informs us that these fishes propagate their species like the shark. He adds that in the gulph of Guinea they follow ships for the sake of the offals, and hence the Dutch give them the name of dung-fish. Though so small, they can keep pace with ships in their swiftest course.

PILPAY, a celebrated brahmin, who flourished about A. A. C. 250. He wrote a book of fables, which has been translated into most of the languages of Europe.

PILSEN, a circle in the west of Bohemia, adjoining to Bavaria: iron is the chief mineral product. Its area is 1600 square miles; its population nearly 170,000. It had formerly large silver mines, but they are now exhausted. The pastures are good, and the cheese much esteemed.

PILULÆ, pills. See PHARMACY.

PILULARIA, in botany, pepper-grass, a genus of plants in the class cryptogamia, and order of filices; ranking in the natural method in the fifty-fifth order, filices.

PILUM, a missive weapon used by the Roman soldiers, and in a charge darted upon the enemy. Its point, we are told by Polybius, was so long and small, that after the first discharge it was generally so bent as to be rendered useless. The legionary soldiers made use of the pilum, and each man carried two. The pilum underwent many alterations and improvements, insomuch that it is impossible with any precision to describe it. Julius Scaliger labors to give an accurate account of it. It appears to have been sometimes round, but most commonly square, to have been two cubits long in the staff, and to have had an iron point of the same length hooked and jagged at the end. Marius made a material improvement in it; for, during the Cimbrian war, he so contrived it that, when it stuck in the enemies' shield, it should bend down in an angle in the part where the wood was connected with the iron, and thus become useless to the person who received it.

PILUMNUS, in Roman mythology, the god of the bakers. Turnus boasted of being descended from him. Virg. Æn. ix. 4.

PILUS, Gr. πιλος, carded wool. In anatomy, the short hair which is found all over the body.

PILUS, in botany, a hair: which, according to Linnæus, is an excretory duct of a bristle-like form. They are fine slender, cylindrical, flexible bodies found on the surfaces of the herbaceous parts of plants; some of them punctured, and in some plants, as the borago laxiflora, covered with warts.

They are either simple or undivided, compound or branched. 1. Pili simplices, the most common form of the simple hair is that of a jointed thread, generally too flexible to support itself, and thus most commonly found bent and waved. According to its degree of firmness, its quantity, and the mode of its application to the surfaces of stems and leaves, it constitutes the characteristic of surfaces: thus, the surface is termed pilosus, or hairy, when the hairs are few and scattered, but conspicuous, as in hieracium pilocella;—lanatus, woolly, when they are complicated, but nevertheless the single hairs are distinguishable, as in verbascum;—tomentosus, shaggy, when they are so thickly matted that the individual hairs cannot be distinguished, and when the position of the hair is nearly parallel with the disk, being at the same time straight, or very slightly curved, and thick although unmatted: it constitutes the silky surface, as is seen on the leaves of potentilla anserina, and achemilla alpina. In some instances the simple hair is firm enough to support itself erect; in which case it is usually awl-shaped, and the articulations are shorter towards the base, as in bryonia alba. It does not always, however, terminate in

a point, but sometimes in a small knob, as in the newly-evolved succulent shoots of ligneous plants, belladonna, &c. In some instances also, as on the under disk of the leaves of the symphytum officinale, the simple hair is hooked towards its apex; which occasions the velvety feeling when the finger is passed over the surface of these leaves, the convex part of the curve of the hair being that only which comes in contact with the finger. Another variety of the simple hair is that which has given rise to the term glanduloso-ciliata: it is a slender hollow thread, supporting a small, cup-shaped, glandular body, and is rather to be regarded as a stipate gland. 2. Pili compositi are either plumosus, feathery, which is a simple hair with other hairs attached to it laterally, as in hieracium undulatum; or it is ramosus, branched, that is, lateral hairs are given off from common stalks, as on the petiole of the gooseberry leaf; or it consists of an erect firm stem, from the summit of which smaller hairs diverge in every direction, as in marrubium peregrinum; or it is stellatus, star-like, being composed of a number of simple diverging awl-shaped hairs, springing from a common centre, which is a small knob sunk in the cutis, as on the leaves of marsh-mallow. Some authors have applied the term ramenta to small, flat, or strop-like hairs which are found on the leaves of some of the genus begonia. Thomson.

PIMELITE, a variety of steatite found at Kosemütz in Silesia.

PIMENTA, *n. s.* Fr. *piment;* Span. *pimento.* A kind of spice.

Pimenta, from its round figure, and the place whence it is brought, has been called Jamaica pepper, and, from its mixt flavour of the several aromaticks, it has obtained the name of all-spice: it is a fruit gathered before it is ripe, and resembles cloves more than any other spice. *Hill's Materia Medica.*

Pimenta, or Pimento, or, as Edwards writes, Piemento, in botany, Jamaica pepper, or all-spice, a species of the myrtus. See Myrtus. 'The pimento trees grow spontaneously, and in great abundance, in many parts of Jamaica, but more particularly on hilly situations near the sea, on the north side of that island; where they fill the air with fragrance, and form the most delicious groves that can possibly be imagined. This tree is purely a child of nature, and seems to mock all the labors of man in his endeavours to extend or improve its growth; not one attempt in fifty to propagate the young plants, or to raise them from the seeds, in parts of the country where it is not found growing spontaneously, having succeeded. The usual method of forming a new pimento plantation (in Jamaica it is called a walk) is to appropriate a piece of woodland, in the neighbourhood of a plantation already existing, or in a country where the scattered trees are found in a native state, the woods of which being fallen, the trees are suffered to remain on the ground till they become rotten and perish. Within a year after the first season, abundance of young pimento plants will be found growing vigorously in all parts of the land, being without doubt produced from ripe berries scattered there by the birds, while the fallen trees, &c., afford them both shelter and shade. At the end of two years it will be proper to give the land a thorough cleansing, leaving such only of the pimento trees as have a good appearance, which will then soon form such groves as those I have described, and, except perhaps for the first four or five years, require very little attention afterwards. Soon after the trees are in blossom, the berries become fit for gathering; the fruit not being suffered to ripen on the tree, as the pulp in that state, being moist and glutinous, is difficult to cure, and when dry becomes black and tasteless. It is impossible, however, to prevent some of the ripe berries from mixing with the rest; but, if the proportion of them be great, the price of the commodity is considerably injured. It is gathered by the hand; one laborer on the tree, employed in gathering the small branches, will give employment to three below (who are generally women and children) in picking the berries; and an industrious picker will fill a bag of 70 lbs. in the day. The returns from a pimento walk in a favorable season are prodigious. A single tree has been known to yield 150 lbs. of the raw fruit, or 1 cwt. of the dried spice; there being commonly a loss in weight of one-third in curing; but this, like many other of the minor productions, is exceedingly uncertain, and perhaps a very plenteous crop occurs but once in five years.

PIMP, *n. s.* Fr. *pinge;* Belg. *poppere.* Skinner. A procurer; pander; one who provides gratifications for the lust of others.

I'm courted by all
As principal *pimp* to the mighty king Harry.
Addison.

Lords keep a *pimp* to bring a wench;
So men of wit are but a kind
Of panders to a vicious mind;
Who proper objects must provide
To gratify their lust of pride. *Swift.*

PIMPILLO, a species of Cactus, which see.

PIMPINELLA, burnet saxifrage; a genus of the dyginia order, and pentandria class of plants: in the natural method ranking under the forty-fifth order, umbellatæ. There are seven species: the most remarkable are:—

1. P. anisum, the common anise, is an annual plant, which grows naturally in Egypt, but is cultivated in Malta and Spain; from whence the seeds are annually imported into Britain. The lower leaves of this plant are divided into three lobes, which are deeply cut on their edges; the stalk rises a foot and a half high, dividing into several slender branches, garnished with narrow leaves, cut into three or four narrow segments, terminated by pretty large loose umbels, composed of smaller umbels or rays, which stand on pretty long foot-stalks. The flowers are small, and of a yellowish white; the seeds are oblong and swelling. The former species requires no culture; the latter is too tender to be cultivated for profit in this country. However, the seeds will come up if sown in the beginning of April upon a warm border. When they come up, they should be thinned and kept clear of weeds, which is all the culture they require.

2. P. major, or greater burnet saxifrage, growing naturally in chalky woods, and on the sides

of the banks near hedges, in several parts of England. The lower leaves of this sort are winged; the lobes are deeply sawed on their edges, and sit close to the midrib, of a dark green. The stalks are more than a foot high, dividing into four or five branches. The lower part of the stalk is garnished with winged leaves, shaped like those at the bottom, but smaller; those upon the branches are short and trifid; the branches are terminated by small umbels of white flowers, which are composed of smaller umbels or rays. The flowers have five heart-shaped petals, which turn inward, and are succeeded by two narrow, oblong, channelled seeds. Both these species are used in medicine. The roots of pimpinella have a grateful, warm, very pungent taste, which is entirely extracted by rectified spirit; in distillation the menstruum arises, leaving all that it had taken up from the root united into a pungent aromatic resin. This root promises, from its sensible qualities, to be a medicine of considerable utility, though little regarded in common practice; the only officinal composition in which it is an ingredient is the pulvis ari compositus. Stahl, Hoffman, and other German physicians, are extremely fond of it; and recommend it as an excellent stomachic, resolvent, detergent, diuretic, diaphoretic, and alexipharmic. They often gave it with success in scorbutic and cutaneous disorders, foulness of the blood and juices, tumors and obstructions of the glands, and diseases proceeding from a deficiency of the fluid secretions in general. Boerhaave directs the use of it in asthmatic and hydropic cases, where the strongest resolvents are indicated; the form he prefers is a watery infusion; but the spirituous tincture possesses the virtues of the root in much greater perfection. Aniseeds have an aromatic smell, and a pleasant warm taste, accompanied with a degree of sweetness. Water extracts very little of their flavor; rectified spirit the whole. The seeds are in the number of the four greater hot seeds; their principal use is in cold flatulent disorders, where tenacious phlegm abounds, and in the gripes to which young children are subject. Frederick Hoffman strongly recommends them in weakness of the stomach, diarrhœas, and for strengthening the tone of the viscera in general; and thinks they well deserve the appellation given them by Helmont, intestinorum solamen. The smaller kind of aniseeds brought from Spain are preferred.

PIMPLA, a mountain of Macedonia, near Olympus, sacred to the Muses, hence called Pimpleæ.

PIM'PLE, *n. s.* Fr. *pompette.* A small red pustule.

If Rosalinda is unfortunate in her mole, Nigranilla is as unhappy in a *pimple*. *Addison's Spectator.*

If e'er thy gnome could spoil a grace,
Or raise a *pimple* on a beauteous face. *Pope.*

The rising of a *pimple* in her face, the sting of a gnat, will make her keep her room two or three days. *Law.*

PIMPLES. By mixing equal quantities of the juice of house-leek, sedum minus, passed through paper, and of spirit of wine rectified by itself, a white coagulum of a very volatile nature is formed, which Dr. Bughart commends for curing pimples of the face; and says that the thin liquor separated from it with sugar-candy is an excellent remedy for thick viscid phlegm in the breast.

PIN, *n. s.* } **PIN'FOLD.** } Sax. pinvan, to shut up, and fold. To shut up; enclose: a place in which beasts are confined.

The Irish never come to those raths but armed: which the English nothing suspecting, are taken at an advantage, like sheep in the *pinfold*. *Spenser.*

If all this be willingly granted by us, which are accused to *pin* the word of God in so narrow a room, let the cause of the accused be referred to the accuser's conscience. *Hooker.*

I care not for thee.
—If I had thee in Lipsbury *pinfold*, I would make thee care for me. *Shakspeare. King Lear.*

Confined and pestered in this *pinfold* here,
Strive to keep up a frail and feverish being.
Milton.

Oaths were not purposed more than law
To keep the good and just in awe,
But to confine the bad and sinful,
Like moral cattle in a *pinfold*. *Hudibras.*

PIN, *n.s.* & *v.a.* } PIN'CUSHION, } PIN'DUST. } Sax. þinn; Belg. *pin*; Fr. *espingle*; Lat. *spina, spinula*; barb. Lat. *pennum*. A short wire with a sharp point used chiefly by women to fasten their clothes: any peg or small bolt; a small roller; a musical note or strain; horny substance formed in the eye: to fasten with pins; join: pincushion is a cushion for sticking pins upon: pindust, that which is made in pointing pins.

His fetch is to flatter to get what he can;
His purpose once gotten, a *pin* for thee than.
Tusser.

Soon after comes the cruel Saracen,
In woven mail all armed warily,
And sternly looks at him, who not a *pin*
Does care for look of living creature's eye.
Spenser.

I'll make thee eat iron like an ostridge, and swallow my sword like a great *pin*, ere thou and I part. *Shakspeare.*

Bedlam beggars with roaring voices,
Sticks in their numbed and mortified bare arms,
Pins, wooden pricks, nails, sprigs of rosemary.
Id.

Romeo is dead, the very *pin* of his heart cleft with the blind hautboy's butshaft. *Id.*

Wish all eyes
Blind with the *pin* and web. *Id.*

Our gates,
Which yet seem shut, we have but *pinned* with rushes;
They'll open of themselves. *Id. Macbeth.*

They drew his brownbread face on pretty gins,
And made him stalk upon two rolling *pins*. *Corbet.*

If removing my consideration from the impression of the cubes to the cubes themselves, I shall *pin* this one notion upon every one of them, and accordingly conceive it to be really in them; it will fall out that I allow existence to other entities which never had any. *Digby of Bodies.*

The little parts of *pindust*, when mingled with sand, cannot, by their mingling, make it lighter.
Digby.

These bullets shall rest on the *pins*; and there must be other pins to keep them. *Wilkins.*

With *pins* of adamant
And chains they made all fast.
Milton's Paradise Lost.

'I've learned how far I'm to believe
Your *pinning* oaths upon your sleeve.
Hudibras.

'Tis foolish to appeal to witnesses for proof, when 'tis not a *pin* matter whether the fact be true or false. *L'Estrange.*

As the woman was upon the peevish *pin*, a poor body comes, while the froward fit was upon her, to beg. *Id.*

They help to cozen themselves, by chusing to *pin* their faith on such expositors as explain the sacred scripture in favour of those opinions that they beforehand have voted orthodox. *Locke.*

She would ruin me in silks, were not the quantity that goes to a large *pincushion* sufficient to make her a gown and petticoat. *Addison's Guardian.*

Thou art a retailer of phrases, and dost deal in remnants of remnants, like a maker of *pincushions*. *Congreve.*

Whatever spirit, careless of his chargo,
His post neglects, or leaves the fair at large,
Shall feel sharp vengeance soon o'ertake his sins,
Be stopt in vials, or transfixt with *pins*. *Pope.*
Not Cynthia, when her manteau's *pinn'd* awry,
E'er felt such rage. *Id.*

PIN-MAKING. The art of making pins, of brass wire, was not known in England before the early part of the sixteenth century: prior to that period they were made of bone, ivory, or box. They are mentioned in the English statute book first, in the reign of Richard III. (in 1483), prohibiting foreign manufactures. In 1543, by statute 34 & 35 of Henry VIII., cap. vi., it was enacted, 'that no person shall put to sale any pins, but only such as shall be double-headed, and have the heads soldered fast to the shank of the pins, well smoothed, the shank well shapen, the points well and round filed, cauted and sharpened.' The pin manufactory was introduced into Gloucester, in 1626, by John Tilsby.

Though pins are of apparently simple construction, their manufacture, however, is not a little curious. The following is the common process:—When the brass wire, of which the pins are formed, is first received at the manufactory, it is generally too thick for the purpose of being cut into pins. The first operation, therefore, is that of winding it off from one wheel to another with great velocity, and causing it to pass between the two through a circle, in a piece of iron of smaller diameter; the wire, being thus reduced to its proper dimensions, is straightened by drawing it between iron pins, fixed in a board, in a zig-zag manner, but so as to leave a straight line between them; afterwards it is cut into lengths of three or four yards, and then into smaller ones, every length being sufficient to make six pins: each end of these is ground to a point, which is done by boys, each of whom sits with two small grinding-stones before him turned by a wheel. Taking up a number in his hands he applies the ends to the coarsest of the two stones, being careful, at the same time, to keep each piece moving round between his fingers, so that the points may not become flat: he next gives them a smoother and sharper point, by applying them to the other stone. By this means, a lad of fourteen years old is enabled to point 16,000 pins in an hour. When the wire is thus pointed, a pin is taken off from each end, and this is repeated. The next operation is that of forming the heads, or, as it is termed, head-spinning, which is done by means of a sort of spinning-wheel; one piece of wire being thus, with great rapidity, wound round another, and the interior one being drawn out, leaves a hollow tube between the circumvolutions; it is then cut with shears, every two circumvolutions or turns of the wire forming one head: these are softened by throwing them into iron pans, and placing them in a furnace till they are red hot. As soon as they are cold they are distributed to children, who sit with anvils and hammers before them, which they work with their feet, by means of a lathe, and, taking up one of the lengths, they thrust the blunt ends into a quantity of heads which lie before them, and catching one at the extremity, they apply it immediately to the anvil and hammer, and, by a motion or two of the foot the pointed end and the head are fixed together in much less time than it can be described, and with a dexterity only to be acquired by practice.

A new invention for heading pins by Mr. William Bundy, of Camden Town, obtained his majesty's letters patent, in September 1809. This operation is performed by means of a frame or stock made of metal, in which are fitted a pair of steel dies, in the manner of those generally used in the manufacture of screws, held together by cylinders; the dimensions may be various, according to the quality of the work, but the dies most generally in use are about two inches long and one inch wide. In the prominent parts, and on that side of each of the two dies which comes in contact when in use, are made corresponding grooves, which when pressed together form holes, each to be the diameter of the shaft intended to have the head fixed on; these holes may be made tapering upwards, or contracted at that part close under the head, where half a hemisphere, whose diameter being that of the size of the head required, is to be worked out. Viewing the dies thus worked, and in a particular kind of frame, which is the position in which they are placed while introducing the pointed shafts, each having a head loosely put on, the upper die being at liberty in the frame, the pressure of its weight will be found sufficient to hold the number of shafts, with their heads in their respective places, while they are pushed forwards with a straight motion till the quantity of the heads prevents the shafts from going any farther. In this state it is necessary to turn a lever, to which is fixed a screw for the purpose of forcing the dies together, which will hold the shafts firm enough to receive a stroke from a press on the top piece to secure and form complete the whole number of heads in the dies. The hemispheres are to be finished according to fancy, as respects the ornament or figure of moulding intended for the top of the head by sinking them accordingly. The patentee says, 'I leave a point in the centre of those cavities in the top piece, which serves, when forced into the top of the shaft, to widen it there, and form a rivet, and thereby secure the head firm from coming off the top of the shaft; and, the dies being hard screwed together with

the lever, there will be a collar formed by that pressure on the shaft under the head sufficient to prevent the liability of the head being by any ordinary means forced down the shaft.' Having described the working parts, and explained the process by the drawings, Mr. Bundy adds, that 'placing the whole in a fly press, one stroke therewith on the top-piece will be found sufficient to complete the whole number of heads in the dies.' Hitherto it has been the practice to strike the head several times, 'but my method,' says Mr. B., 'of effectually and securely fastening the heads on the shafts, and leaving the heads of a superior form, is by placing the shafts in a perpendicular direction, and striking the heads and shafts on their tops, which I call superior heads, and which method I claim as my invention. To succeed in the completest manner in forming these superior heads, it will be necessary that the dimensions of the heads before they are fixed to the shafts, should be particularly attended to. If they are to be of nearly a spherical figure, they should be prepared of a greater depth of axis than the diameter; that the diameter may be small enough to go freely into the hemispheres in the dies and top-piece which are to receive them; for this purpose head wire may be made flat, either by drawing or rolling to a size, so that when spun one or more rounds will be sufficient for a head. I recommend head wire of a smaller size than ordinary without flatting, so that when spun and cut three rounds, it shall contain the quantity of metal required for the size of the intended head.' When the heads have been fixed on the shafts by the fly press, the screw is then to be turned back by a lever; and taking hold of the milled head, which is on the head of the small shaft, and which goes through the screw and is fixed to the top dies by being screwed hard in the die, it may be drawn back to separate the dies sufficiently wide for the superior headed pins which they contain, to fall through into some place prepared to receive them.

The pin is now finished as to its form, but requires coloring; it is therefore thrown into a copper containing a solution of tin and lees of wine, where it remains some time, but when taken out it assumes a white but very dull appearance: to give it a polish, it is put into a tub containing a quantity of bran, which is set in motion by turning a shaft that runs through its centre; and thus by means of friction it becomes perfectly bright. The pin being complete, it only remains to separate it from the bran, which is performed by a sort of winnowing, the bran flying off and leaving the pin behind. On the continent the mode of tinning brass pins is rather different. A vessel is filled by layers with plates of tin and brass pins, a tin plate being at the bottom and another at the top. The vessel is then filled with water, adding some cream of tartar, by the acid of which the tin is dissolved. After about five hours' boiling the pins are found to be uniformly tinned.

The pins of this country are those most in repute, as well in the pointing as the whitening, because our pin-makers in pointing use two steel mills, the first of which forms the point, and the latter takes off the irregularities, and renders it smooth, and as it were polished. In whitening they make use of the best block-tin granulated; whereas in some places they are said to have recourse to a mixture of tin, lead, and quicksilver; which not only whitens worse than tin, but is also dangerous on account of the ill quality of the mixture, which renders a puncture with a pin thus whitened somewhat difficult to be cured.

Pins are sometimes made of iron wire, rendered black by a varnish of linseed oil with lampblack; these are designed for the dress of persons in mourning.

We understand that the well-known manufacturers, Messrs. Durnford, Francis, and Co., of Gracechurch Street London, have also an invention for putting on the heads of this useful little article, with expedition and uniformity, which they find too profitable for disclosure. We have only therefore to notice further—

Wright's patent pin-making machinery.—This ingenious machine comprehends a diversity of mechanical movements and contrivances, by which a coil of wire is rapidly converted into pins, without the instrumentality of manual assistance, or any extraneous aid whatever. The wire being placed on a reel, and the machine set in operation by steam, or other motive power, the main shaft, upon which the several cams are fixed, begins to revolve, and the various mechanical apparatus thus put in motion, simultaneously draws the wire, straightens it, cuts it of the required length, points it, forms the head, and drops the pin thus perfected into a receptacle prepared for it. A piece of mechanism embracing so many movements, and performing such a variety of functions essentially differing from each other, may be considered so complicated as to prove very troublesome while in action, and liable to be easily disarranged; but this machine is comparatively simple in its construction, performs its various motions with little noise, and less apparent effort, and cannot readily be put out of order. Its susceptibility of adjustment, too, greatly recommends it, as the pins may be made of different lengths, the heads of various forms, and the points lengthened or shortened at pleasure, without arresting the progress of any of the movements. The wire for four pins, is operated upon at the same time, and the machine completes with facility forty perfect pins per minute, of a quality superior in every respect to the best of those in ordinary use.

In plates I. & II. Pin-Making (to which we indiscriminately refer in this article, as the figures are in both plates), fig. 1 is a geometrical representation of the machine taken on the side; fig. 2 is a similar view, exhibiting the end; and fig. 3 is the plan or horizontal appearance of the top: similar letters refer to the same parts in each of these three figures. A coil of brass wire of the size suited to the intended pin is placed upon the reel *a*, which turns loosely upon its vertical axle at the side of the machine. The end of the wire is brought forward and passed between the pins of the plate *b* (fig. 3), called a straightening plate, which is intended to guide the wire in a direct line as it advances; it is thence passed between the chaps of the pincers *c*, where it is held fast and conducted into the cutting dies *d*.

Having thus disposed the wire, the machinery is to be put in motion, either by turning a winch, or by gear connected to the shaft *e*. At one end of this shaft a fly-wheel is attached to regulate the motion, and at the reverse a beveled toothed-wheel, which takes into another beveled toothed-wheel on the end of the main shaft, *f*, *f*, *f*. Upon this main shaft a series of cams are fixed, which, as the shaft revolves, respectively press against certain bars and levers, and thereby give motion to all the operative parts of the engine.

The movements of the machine first bring forward the end of the wire, which is held between the pincers; this is done by the cam 1, as the shaft revolves, working against the friction roller at the end of the slider *g*, by which that slider is pushed forward. The effect of projecting the slider is, in the first place, to move the small cross lever *h*, when a tappet under that lever presses out against an inclined plane on one of the legs of the pincers, which therefore closes the chaps, and causes the wire to be held securely; the further progress of the slider brings the projecting piece 2 against the end of a screw on the side of the pincers'-carriage, by which means the pincers holding the end of the wire are advanced a certain distance. This distance is regulated by the adjustment of the screws, and by that means the machine is enabled to make the pins longer or shorter, as may be required. A length of wire sufficient for one pin having been thus brought forward, on the retiring of the cam 1, a worm spring carries the slider back to its former position; and in doing this the small lever *h*, by quitting the inclined plane, enables the chaps of the pincers to open, and then the projecting piece 2, striking against the other screw, forces the pincers'-carriage back with it, the wire being at that time held fast by the pins on the straightening plate, and thereby prevented from returning. Thus so much of the wire as will be required to form one pin is made to advance at every revolution of the cam 1.

Supposing a sufficient length of wire for making one pin to have been passed through the die *d*, it is now to be cut off. The manner of doing this will be best seen by reference to the detached figure 4, which is a section of the die upon an enlarged scale; 3 is a roller at the end of the arm *i*, seen affixed to the slider *g*, in fig. 3. When the slider *g* returns, after driving the wire forward, the roller 3 presses against the inclined plane on the under side of the lever 4, and, by raising it, depresses the reverse end of the lever, and thereby presses down the cutter 5, which has a sharp edge at the apex of its conical recess, and thereby cuts off the length of the wire for one pin. The advance of the slider *g*, at a second operation, sends forwards the roller 3, and the lever 4 descends, by which the pin is released, and is taken thence by the carrier about to be described. These carriers are seen at *k*, *k*, *k*, in figs. 2 and 3, affixed to the bar *l*, *l*, by sockets and screws, which bar slides laterally to and fro with the carriers for the purpose of taking the pins from one operation to the next. The construction of the carriers will be best understood by reference to the detached fig. 5, which exhibits a side and end view, upon an enlarged scale; its holding part is a pair of pincers, the upper chap being a firm piece of metal fixed to its stent, the lower chap attached by a spring, which presses them together. The opening of the chaps is exactly in the line of the die *d*, so that, when the carrier by the sliding of the bar *l* is brought opposite to the die, the pin slips sideways in between the chaps, and is there held by the spring in a small groove: the lever of the cutting die rising at the same time, as before explained, releases it.

The lateral movement of the bar *l*, by which the pin is carried from the cutting die to be pointed, is effected by the rotation of the eccentric cam 6, upon the main shaft *f*, which cam as it revolves occasionally presses down the lever *m*, and by means of a cord attached to the end of this lever, and passed over the pulley 7, to the shackle at the end of the bar *l*, that bar with the carriers is drawn forward.

The pin has now been brought by the carrier *k* to the first pointing wheel *n*, and is there received by the first holder *o*. This piece of mechanism, called the holder, is shown detached at fig. 6. It is of a cylindrical form, with a mouth and moving chap 9. The end of the pin is brought by the carrier into the mouth of the holder, and is there held until the chaps close and confine it, which is done by the following contrivance:—As the main shaft *f* revolves, the cam 10 recedes from the friction wheel at the end of the sliding bar *p*, and enables a powerful spring beneath to draw backward the bar *p*, which carries with it the yoke *q*, and the collars *r*, that are embraced by the yoke; which collars slide upon the cylindrical holders *o*, as seen in fig. 6. At the hinder part of the lever which moves the chap 9 (see fig. 6), there is an inclined plane, which is raised by a notch in the collar *r* as it recedes, and by that means the chap is closed and the pin held fast, the part intended for the point standing over the pointing wheel *n*. The lever *m* now rising, the bar with the carriers will be drawn back into their former situation by the force of the spring 8, and remain there ready to take hold of and carry forward succeeding pieces of wire.

The pointing of the wire is effected by the rapid revolution of the bevel-wheel *n*, which is cut on its edge, like a file. This bevel-wheel is actuated by a band, extending from a series of multiplying wheels in connexion with the revolution of the fly-wheel on the axle of the shaft *e*. From this fly-wheel a band is conducted down to the rigger *r*, as seen in figs. 1 and 2; upon the shaft of which rigger there is a large wheel *s*, from whence a band passes to the rigger *t*, and upon the shaft of this rigger *t* there are the large wheels *u*, *u*, from whence bands pass upwards to the pointing wheels *n*. Thus, as the shaft *e* turns, the pointing wheels *n* revolve with a multiplied velocity, equal to about 4000 times that of the fly-wheel. In order to bring the end of the pin down upon the pointing wheel, *n*, the holder *o* must be tilted; this is provided for by mounting the holder-carriage upon axles, which allow it to vibrate, the tilting being effected by the cam 12 on the shaft *f*. As this shaft revolves, the periphery of the cam 12 runs against the upper side

of the lever 13, the end of which is attached to the holder-carriage (see figs. 3 and 6) and keeps the holder in a level position during one-half of the revolution; but when the cam releases it, which is the case at the time the pointing is about to commence, a spring draws up the lever 13, and the carriage is so far tilted as to allow the pin to come in contact with the periphery of the pointing wheel. It is also necessary to hold the pin steadily upon the wheel while the pointing is performed; this is done by the lever 14 (see fig. 6), which moves upon pivots. As the cam 15, on the shaft *f*, fig. 3, revolves, it pushes the sliding bar 16, which has at its end a small inclined plane 17 (see fig. 6), that lifts the back end of the lever, and consequently depressing the front part where the finger 18 is attached; by these means the finger is made to bear upon the pin, and hold it down in contact with the rapidly revolving pointing wheel *n*, before described.

It is necessary to turn the pin round while it is in contact with the pointing wheel, and for this purpose the pin-holder is made to revolve by the following means:—On the shaft *f*, fig. 2, there is a cam which acts against the under side of the weighed lever *v*, *v*, at the end of which lever there is a vertical rack 19, taken into the toothed pinion at the hinder part of the holder *o*; this pinion is seen at 20, in fig. 6, and, by the rising and falling of this lever and rack, the pin-holder is made to turn with considerable speed; at the same time the pointing-wheel, revolving with great velocity, as above said, cuts or files away the end of the pin in a bevel direction, and effects the pointing.

As the pointing is considered not to be complete from the operation of the first pointing-wheel, a second pointing-wheel is introduced, which has a finer cut file upon its edge. The pin, after having undergone the first process of pointing, is carried from the first holder *o* to the second *o*, by the second carrier *k*, exactly in the same manner as before described; the second holder now clasps the pin between its chaps, by similar means to those already explained, and the holder and pointing-wheel both revolve, to complete the point of the pin by the agency of wheels and bands, actuated, as above said, by the rotation of the shaft *e*, and its fly wheel. The third carrier *k* now takes the pin from the second pointing-holder *o*, and conducts it to the first heading die *w*, which is seen detached, upon a larger scale, and in section, at fig. 7. This die is set in its frame as at *w*, in figs. 1, 2, and 3; the lower half being fixed to the frame, the upper half to the lever above, which rises by the action of a flat spring, and opens the mouth or chaps of the die. The pin being in this situation between the chaps, the cam 21 upon the shafts *f* as it revolves acts against the friction roller 22, at the top of the upright lever 23, and drives the connecting rod 24 forward, by which means the upper chap of the heading die is brought down, and the pin held fast. When the pin is thus secured between the chaps of the die, the cam 25 projects forward the heading bar *x*, *x*, *x*, which, by striking against the end of the cylinder 26, fig. 7, drives the steel punch 27, at the extremity of the cylinder, against the end of the pin about to be headed, and forces a portion of the wire into a circular recess in the die, so as to produce by its pressure a solid head to the pin. The fourth carrier *k* now takes hold of the pin, and, the parts of the die opening as the cams 21 and 25 revolve, the pin is conducted by the carrier to the second heading apparatus to be completed, a section of which is shown at fig. 8. The pin is now held by the carrier opposite to the opening of the second heading-die *y*, when the advance of the heading-bar *x*, as before described, causes the punch 28 to be driven forward, and the point of the pin to be pushed into the recess of the die, where, the partially formed head stopping the progress of the pin, the punch presses it with very great force, and completes the formation of the solid head.

The pin being now completed, it only remains to withdraw it from the die *y*, which is done by the following contrivance:—Behind the die a piece of bone or wood is placed in a sliding rod 29, for the point to enter: this rod has a helical spring coiled round it, which keeps it up against the back of the die, and, when the pin is forced into the piece of bone by the advance of the punch, the rod 29 recedes, but as soon as the punch is withdrawn the spring forces the rod back again, and the pin with it, by which the head of the pin is made to stand out of the die. A small forked lever *z*, attached to the heading-bar *x*, now drops on to the end of the pin, and, as the heading-bar with the forked lever retires, the pin is drawn out of the die and let fall into a box or other receptacle below.

The several parts and different operations of this highly ingenious piece of machinery having been particularly explained, it may be desirable to recapitulate in a general way the several movements, by which, from plain wire, the pins are formed and perfected in their progress through the machine, four pins being under operation at the same time.

The rotation of the shaft *f* causes the several cams thereon to move the sliders, levers, and wheels, that work the different parts of the machine. The slider *g* pushes the pincers *c* forward, which draws the wire from the reel *a*, and at every rotation of the shaft advances such a length of wire as will produce one pin. The die *d* cuts off the length of wire by the descent of its upper chap, which piece is shown (full sized) at A, fig. 10; and, when the chap opens, the first carrier *k* takes the pin from thence to the pointing apparatus. Here the pin is received by the holder, which turns round while the bevel-edged file wheel rapidly revolving reduces the end of the wire to a point, as seen at B, fig. 10. The pin is thence conducted by the second carrier to the finer file wheel, where the point is completed by a similar operation, as seen at C, fig. 10. The third carrier now takes the pin to the first heading die, where the advance of a steel punch forces the end of the pin wire into a recess, and partly forms the head, as at D, fig. 10. The fourth carrier takes the pin from thence and brings it to the second heading-die, where the head is perfected, as at E, fig. 10; and the retiring of the heading-bar causes a forked lever to draw the finished pin from the die, and drop it into a receptacle below.

Inconsiderable as the article produced by this scientific piece of mechanism may appear to the superficial observer, it is nevertheless stated, from incontrovertible sources of information, that more than 15,000,000 of pins are *daily* manufactured in this country, to meet the demand for home consumption and foreign markets. There is little doubt that the superior quality of these pins, and the facility and perfection with which they are produced by this invention, will supersede every other mode of manufacturing them. Little use has yet been made of the machinery.

PINACIA, among the Athenians, were tablets of brass inscribed with the names of all those citizens in each tribe who were duly qualified and willing to be judges of the court of Areopagus. These tablets were cast into a vessel provided for the purpose, and the same number of beans, 100 being white and all the rest black, were thrown into another. Then the names of the candidates and the beans were drawn out one by one, and they whose names were drawn out together with the white beans were elected judges or senators. In Solon's time there were only four tribes, each of which chose 100 senators; but, the number of tribes afterwards increasing, the number of senators or judges increased to so many hundreds more.

PINACOTHECA, Gr. πιναξ, a picture, and τιθημι, to put, in archaiology, signified what we denominate a cabinet or gallery of paintings, and in this sense it is employed by Vitruvius, who, speaking of the different divisions and chambers of a house, assigns to each its due proportions with the exception of the pinacotheca, respecting which he only says that it should be spacious, and, if possible, on the north side, because, it being desirable to give this apartment a light always equal, that end could not be attained so well from any other aspect.

PINÆUS. See PINEAU.

PINARUS, a river which runs between Syria and Cilicia, and falls into the sea near Issus; now called Delifou.—Dionys.

PIN'CERS, *n. s.* Fr. *pincette*; or from pinch. An instrument by which nails are drawn, or any thing griped or pinched.

As superfluous flesh did rot,
Amendment ready still at hand did wait,
To pluck it out with *pincers* fiery hot,
That soon in him was left no one corrupt jot.
Spenser.

The circumcellions exercised horrible cruelties upon the orthodox; killing some; torturing others; blowing lime and vinegar into the eyes of God's ministers, and tearing off the breasts of women with *pincers*. *Bp. Hall.*

Every ant brings a small particle of that earth in her *pincers*, and lays it by the hole. *Addison.*

PINCH, *v. a.* & *n. s.* Fr. *pincer*: Spanish *pinzar*. To squeeze forcibly and sharply: hence to oppress; gall; distress; gripe: a pinch is a squeeze of the above kind: oppression; difficulty; time of distress.

There is that waxeth rich by his wariness, and *pinching*. *Ecclus.*

When the doctor spies his vantage ripe,
To *pinch* her by the hand,
The maid hath given consent to go with him.
Shakspeare.

Thou shalt be *pinched*
As thick as honey-combs, each *pinch* more stinging
Than bees that made them. *Id. Tempest.*

As they *pinch* one another by the disposition, he cries out, no more. *Id. Antony and Cleopatra.*

Return to her! no, rather I chuse
To be a comrade with the wolf and owl,
Necessity's sharp *pinch*. *Id. King Lear.*

Want of room upon the earth's *pinching* a whole nation begets a remediless war, vexing only some number of particulars, it draws on the arbitrary. *Raleigh's Essays.*

A good sure friend is a better help at a *pinch* than all the stratagems of a man's own wit. *Bacon.*

Avoid the *pinching* cold and scorching heat.
Milton.

A difficulty *pincheth*, nor will it easily be resolved.
Glanville.

She *pinched* her belly with her daughter's too,
To bring the year about with much ado. *Dryden.*

But thou
Know'st with an equal hand to hold the scale,
See'st where the reasons *pinch*, and where they fail.
Id.

If any straggler from his rank be found,
A *pinch* must for the mortal sin compound. *Id.*

The commentators never fail him at a *pinch*, and must excuse him. *Id.*

The beaver, when he finds himself hard *pinched*, bites them off, and, leaving them to his pursuers, saves himself. *L'Estrange.*

The devil helps his servants for a season; but when they come once to a *pinch* he leaves them in the lurch. *Id.*

This is the way to *pinch* the question; therefore, let what will come of it, I will stand the test of your method. *Collier.*

He would *pinch* the children in the dark so hard, that he left the print in black and blue. *Arbuthnot.*

Nic. Frog would *pinch* his belly to save his pocket, *Id.*

They at a *pinch* can bribe a vote.
Swift's Miscellanies.

When the respondent is *pinched* with a strong objection, and is at a loss for an answer, the moderator suggests some answer to the objection of the opponent. *Watts.*

Afford them shelter from the wintry winds;
The sharp year *pinches*. *Thomson's Autumn.*

PINCHBECK, an alloy of copper, in which the proportion of zinc is greater than in brass. According to Dr. Thomson, when the alloy contains three parts of zinc and four of copper, it assumes a color nearly the same with gold, but it is not so malleable as brass. It is then called pinchbeck, prince's metal, or Prince Rupert's metal.

PINCKNEYVILLE, a post town of Wilkinson county, Mississippi, five miles east of the Mississippi, about sixteen south-east of Fort Adams. It is situated in a very pleasant and fertile country.

PINCUM, in ancient geography, a town of Mœsia Superior, now called Gradisca.

PINDAR, the prince of lyric poets, was born at Thebes, about 520 years B. C. He received his first musical instructions from his father, who was a flute-player by profession; after which, according to Suidas, he was placed under Myrtis, a lady of distinguished abilities in lyric poetry. During this period he became acquainted with the poetess Corinna, who was likewise a student

under Myrtis, and, Pausanias says, one of the most beautiful women of her time. Plutarch tells us, that Pindar profited from the lessons which Corinna, more advanced in her studies, gave him at this school. The first poetical effusions of a genius so full of fire and imagination as that of Pindar would be wild and luxuriant; and Lucian has preserved six verses, said to have been the exordium of his first essay, in which he crowded almost all the subjects for song which ancient history and mythology then furnished. Upon communicating this attempt to Corinna, she told him, smiling, that he should sow with the hand, and not empty his whole sack at once. Pindar, however, soon quitted the leading-strings of his poetical nurses, and became the disciple of Simonides, now in extreme old age: after which he soon surpassed all his masters, and acquired great reputation over all Greece; but was less honored in his own country than elsewhere; for at Thebes he was often said to be vanquished, in the musical and poetical contests, by candidates of inferior merit. Indeed at that period little fame in these accomplishments was to be acquired, otherwise than by entering these lists. Accordingly we find that both Myrtis and Corinna publicly disputed the prize with him at Thebes. He obtained a victory over Myrtis, but was vanquished five different times by Corinna. But this, says Pausanias, was because the judges were more sensible to the charms of beauty than to those of music and poetry. When he quitted that city, as his judgment was matured, he avoided the errors for which he had been chastised, and suddenly became the wonder and delight of all Greece. Every hero, prince, and potentate, desirous of lasting fame, courted the muse of Pindar. He seems to have been often present at the festivals of the Olympian, Pythian, Nemean, and Isthmean games, as may be inferred from several expressions in the odes which he composed for the victors in them all. Those at Olympia who were ambitious of having their achievements celebrated by Pindar, applied to him for an ode, which was first sung in the Prytanean or town-hall of Olympia, where there was a banqueting room, set apart for the entertainment of the conquerors. Here the ode was rehearsed by a chorus, accompanied by instruments. It was afterwards performed in the same manner at the triumphal entry of the victor into his own country, in processions or at the sacrifices that were made with great pomp and solemnity on the occasion. There is no great poet in antiquity whose moral character has been less censured than that of Pindar. Plutarch has preserved a single verse of his Epicedium or Dirge that was sung at his funeral; which, short and simple as it is, implies no small praise: 'This man was pleasing to strangers, and dear to his fellow-citizens. His works abound with precepts of morality: and it does not appear that he ever traduced even his enemies, comforting himself, for their malignity, by a maxim which he inserted in his first Pythic, and which afterwards became proverbial, 'That it is better to be envied than pitied.' Pausanias says, Pindar's character as a poet was consecrated by the god of verse himself, who, by an express oracle, ordered the people of Delphos to set apart for Pindar one-half of the first-fruit offerings brought by the religious to his shrine, and to allow him a conspicuous place in his temple, where in an iron chair he used to sit and sing his hymns in honor of that god. This chair was remaining in the time of Pausanias, several centuries after, and shown to him as a relic worthy of the sanctity and magnificence of that place. Fabricius tells us that Pindar lived to the age of ninety; and, according to the chronology of Dr. Blair, he died 435 years B. C., aged eighty-six. His fellow citizens erected a monument to him in the Hippodrome at Thebes, which was extant in the time of Pausanias; and his renown was so great after his death that his posterity derived very considerable honors and privileges from it When Alexander the Great attacked the city of Thebes, he gave express orders to his soldiers to spare the house and family of Pindar. The Lacedemonians had done the same before this period; for, when they ravaged Bœotia and burned the capital, the following words were written upon the door of the poet:—'Forbear to burn this house; it was the dwelling of Pindar.' Respect for the memory of this great poet continued so long, that, even in Plutarch's time, the best part of the sacred victim at the Theoxenian festival was appropriated to his descendants The latest and best edition of this poet is that of Heyne, 1798, 8vo. which contains the Greek Scholia. There is an English version of Pindar, by Gilbert West, which is much esteemed.

PINDARIC ODE, in poetry, an ode formed in imitation of the manner of Pindar. See POETRY.

PINDASUS, a mountain of Troas.

PINDENISSUS, a town of Cilicia, on the borders of Syria. Cicero, when proconsul of Asia, took it after a siege of twenty-five days. Cic. Ep. ii. 10.

PINDTARUK, or PINTARA, a small village in the Gujrat Peninsula, extending about two miles from the sea-shore, on a sandy plain, near the south-western extremity. In the neighbourhood is a spring of pink-colored water, celebrated among the natives as a place of pilgrimage. This spring gives its name to the village, which is inhabited only by a few religious persons, who subsist on the bounty of the pilgrims. It lies in the direct road to Dwaraca: persons resorting to that fane take the opportunity of bathing in the pink-colored stream, and thereby purifying themselves. The spring is within high water mark; by which circumstance it is kept constantly clean. The adjacent lands along the coast are much impregnated with iron, which may account for the color and mineral qualities of the spring. In the neighbourhood are many large tanks. The village belongs to the Jam of Noanagur.

PINDUS, in ancient geography, an extensive chain of mountains in Thessaly, inhabited by different people of Epirus and Thessaly, separating Macedonia, Thessaly, and Epirus; having Macedonia on the north, the Perrhœbi on the west, and the Dolopes on the south. (Strabo.) It was sacred to Apollo and the Muses.

PINDUS, a Doric city of Ætolia, situated on a

cognominal river, which falls into the Cephissus. Strabo.

PINE, *v. a.* & *v. n.* Sax þinian; Goth. *pina;* Belg. *pijnen.* To languish; wear away with any kind of misery; wear out; make to languish; grieve for.

Ye shall not mourn, but *pine* away for your iniquities. *Ezekiel.*

The wicked with anxiety of mind
Shall *pine* away; in sighs consume their breath. *Sandys.*

My hungry eyes, through greedy covetise,
With no contentment can themselves suffice;
But having, *pine;* and, having not, complain. *Spenser.*

I burn, I *pine,* I perish,
If I atchieve not this young modest girl. *Shakspeare.*

Since my young lady's going into France, the fool hath much *pined* away. *Shakspeare. King Lear.*

We may again
Free from our feasts and banquets bloody knives,
Do faithful homage and receive free honours:
All which we *pine* for. *Id. Macbeth.*

Part us: I towards the north,
Where shivering cold and sickness *pines* the clime. *Shakspeare.*

Look rather on my pale cheek *pined;*
There view your beauties; there you'll find
A fair face, but a cruel mind. *Carew.*

Where we are left open from all just restraint of divine and human laws, to *pine* ourselves in an affectation of holiness; is but a wayward and thankless austerity. *Bp. Hall.*

To me, who with eternal famine *pine,*
Alike is hell, or paradise, or heaven. *Milton.*

Abash'd the devil stood,
Virtue in her shape, how lovely, saw; and *pined*
His loss. *Id. Paradise Lost.*

Farewel the year that threatened so
The fairest light the world can show;
Welcome the new, whose every day,
Restoring what was snatched away
By *pining* sickness from the fair,
That matchless beauty does despair. *Waller.*

We stood amazed to see your mistress mourn,
Unknowing that she *pined* for your return. *Dryden.*

Beroe *pined* with pain,
Her age and anguish from these rites detain. *Id.*

Thus tender Spencer lived, with mean repast
Content, depressed with penury, and *pined*
In foreign realm: yet not debased his verse. *Philips.*

This night shall see the gaudy wreath decline,
The roses wither, and the lilies *pine.* *Tickel.*

Man was not made to *pine* in solitude,
Ensepulchred, and far from converse placed;
Not for himself alone, untamed and rude,
To live the bittern of the desert waste. *K. White.*

PINE, *n. s.* Latin *pinus;* Fr. *pin.* A tree. See PINUS.

You may as well forbid the mountain *pines*
To wag their high tops and to make a noise,
When they are fretted with the gusts of heaven. *Shakspeare.*

The *pine-tree* hath amentaceous flowers, or katkins, which are produced at remote distances from the fruit, on the same tree; the seeds are produced in squamous cones: to which should be added, that the leaves are longer than those of a fir-tree and are produced by pairs out of each sheath. *Miller.*

All things are here of him; from the black *pines,*
Which are his shade on high, and the loud roar
Of torrents, where he listeneth, to the vines
Which slope his green path downward to the shore,
Where the bowed waters meet him and adore,
Kissing his feet with murmurs. *Byron.*

PINEA, or PIGNE, in commerce, a term used in Peru and Chili for a kind of light, porous masses or lumps, formed of a mixture of mercury and silver dust from the mines. The ore, or mineral of silver, when dug out of the veins of the mine, is first broken and then ground in mills for the purpose, driven by water with iron pestles, each of 200 lbs. weight. The mineral, when thus pulverised, is next sifted, and then worked up with water into a paste; which, when half dry, is cut into pieces, called cuerpos, a foot long, weighing each about 2500 lbs. Each piece or cuerpo is again kneaded up with sea-salt, which, dissolving, incorporates with it. They then add mercury, from ten to twenty lbs. for each cuerpo, kneading the paste afresh until the mercury be incorporated therewith. This office, which is exceedingly dangerous on account of the noxious qualities of the mercury, is always made the lot of the poor Indians. This amalgamation is continued for eight or nine days; and some add lime, lead, or tin ore, &c., to forward it; and, in some mines, they are obliged to use fire. To try if the mixture and amalgamation be sufficient, they wash a piece in water; and, if the mercury be white, it is a proof that it has had its effect; if black, it must be still farther worked. When finished, it is sent to the lavatories, which are large basins that empty successively into one another. The paste, &c., being laid in the uppermost of these, the earth is then washed from it into the rest by a rivulet turned upon it; an Indian, all the while, stirring it with his feet, and two other Indians doing the like in the other basins. When the water runs quite clear out of the basins the mercury and silver are found at bottom incorporated. This matter they call pella, and of this they form the pineas, by expressing as much of the mercury as they can; first, by putting it in woollen bags, and pressing and beating it strongly: then, by stamping it in a kind of woollen mould, of an octagonal form, at bottom whereof is a brass plate pierced full of little holes. The matter, when taken out of the mould, is laid on a trivet, under which is a large vessel full of water; and, the whole being covered with an earthen head, a fire is made around. The mercury still remains in the mass, and is thus reduced into fumes, and, at length condensing, it is precipitated into the water, leaving behind it a mass of silver grains of different figures, which, only joining or touching at the extremes, render the matter very porous and light. This, therefore, is the pinea or pigne, which the workmen endeavour to sell secretly to vessels trading to the South Sea; and from which those who have ventured to engage in so dangerous a commerce have formerly made vast gains.

PIN'EAL, *adj.* Fr. *pineale.* Resembling pine-apple. An epithet given by Des Cartes, from the form, to the gland which he imagined the seat of the soul.

Courtiers and spaniels exactly resemble one another in the *pineal* gland. *Arbuthnot and Pope.*

PINEAL CONCRETIONS. This matter of a stony consistence, sometimes deposited in the substance of the pineal gland, was formerly reckoned, from its position in the centre of the brain, to be the seat of the soul, the intellectual sanctuary. The concretions have been proved by Dr. Wollaston to be phosphate of lime.

PINEAL GLAND, a gland in the third ventricle of the brain, so called from its resembling a pine-apple. See ANATOMY, Index.

PINE'APPLE, *n. s.* The anana, named for its resemblance to the cone of pines.

Try if any words can give the taste of a *pine-apple*, and make one have the true idea of its relish. *Locke.*

The *pineapple* hath a flower consisting of one leaf, divided into three parts, and is funnel-shaped; the embryos are produced in the tubercles; these become a fleshy fruit, full of juice; the seeds, which are lodged in the tubercles, are very small and almost kidney-shaped. *Miller.*

PINE-APPLE. See BROMELIA.

PINE-APPLE, WILD. See RENEALMIA.

PINEAU (Gabriel Du), an eminent French lawyer born at Angers in 1573. After practising some time at Angers, he went to Paris, and practised with eclat before the parliament. Upon his return to Angers he became a counsellor in the presidial court, and was consulted by all the neighbouring provinces. Mary de Medicis made him master of requests, and, in her disgrace, wished to support herself by his credit and counsels; but Du Pineau, equally dutiful to the monarch and his mother, never failed to inculcate sentiments of peace. In 1632 Louis XIII., by way of reward, appointed him mayor and captain-general of the city of Angers: a situation in which he merited the flattering title of Father of the people. This worthy citizen died the 15th of October, 1644, aged seventy-one. His house was a kind of academy, where regular conferences were held, and attended by young officers, advocates, and other literary characters. His writings are, 1. Latin Notes, in addition to those of Du Moulin, upon the Canon Law, printed along with the works of that eminent lawyer by the care of Francis Pinson. 2. Commentaries, observations, and consultations upon several important questions respecting the laws both of Anjou and of France, with some dissertations upon different subjects, &c., reprinted in 1725 in 2 vols. folio, by Livoniere, with Remarks.

PINEAU, or PINÆUS (Severin Du), a native of Chartres, and first surgeon to the king of France. He was very skilful in lithotomy; and has left behind him, 1. A Discourse concerning the Extraction of the Stone in the Bladder, published in 1610, in 8vo. 2. A Treatise De Virginitatis Notis, printed at Leyden 1641, in 12mo. He died at Paris in 1619.

PINEDA (John), a learned Jesuit, born at Seville of a noble family. He entered into that society in 1572. He taught philosophy and divinity in several colleges; devoted his time to the study of the Scriptures; and for that purpose made himself master of the Oriental languages. His works are, 1. Commentaries upon Job, in 2 vols. folio. 2. Two upon Ecclesiastes. 3. A General History of the Church, in Spanish, 4 vols. folio. 4. A History of Ferdinand III. in Spanish, folio. He died in 1637, much regretted.

PINELLI (John Vincent), a learned Italian, born at Naples, son of count Pinelli, a noble Genoese, who had settled in that city, and had acquired a handsome fortune in trade. After receiving a liberal education he repaired to Padua, at the age of twenty-four. He had an excellent library, consisting of a choice collection of books and MSS., which he continued to enrich till the hour of his death. His literary correspondence, not only in Italy, but throughout Europe, procured him all the new works worthy of a place in his collection. In many cities of Italy he had persons employed to search, at least once a month, the stalls of those artificers who make use of old parchments, such as lute-makers, sieve-wrights, and others; and thus often saved from destruction valuable fragments. His passion for knowledge embraced all the sciences; but history, medals, antiquities, natural history, and botany, were his favorite studies. He was consulted from all quarters by the learned world, and corresponded with Justus Lipsius, Joseph Scaliger, Sigonius, Possevin, Peter Pithou, and many others. He had a great dislike to plays, entertainments, shows, &c., we are told, and every thing which most excites the curiosity of other men. During forty-three years that he lived at Padua he was never known to be out of the city but twice; once on occasion of a plague which infested it; and once on a voyage to Naples, at the earnest solicitation of his friends. He died in 1601, aged sixty-eight. Paul Gualdo, who has written Pinelli's life, says, that when his rich library was transported by sea to Naples, it was packed up in 130 chests, of which fourteen contained MSS.; but it did not go wholly to his heirs. The senate of Venice caused their seal to be set upon the MSS. and took away what concerned the affairs of the republic, to the number of 200 pieces.—'I compare,' says De Thou, 'Pinelli to Titus Pomponius; for, as that illustrious Roman was called Attic, Pinelli also bore the title of Venetian, on account of the great affection which the republic of Venice had for him.'

PINEROLO, or PIGNEROL, a town and bishop's see in Piedmont, delightfully situated at the foot of a fertile hill, behind which rise some elevated summits of the Alps. It stands on the river Clusone, and is neither regular nor well built, but contains a handsome hospital and cavalry barracks. The population, including the adjacent district, amounts to 10,000, who manufacture woollens, silk, paper, and leather. Their trade in these articles, corn, wine, spirits, and fire-wood, is considerable. The air is thought salubrious. Pinerolo was formerly a place of strength; but, on its cession to Savoy in 1713, its fortifications were blown up. It is surrounded at present only by a slight wall. Twenty-two miles S.S.W. of Turin.

PINES, ISLAND OF, in the South Pacific Ocean, is situated near the southern point of New Caledonia. It is about eighteen leagues in circum-

ference, and fourteen or fifteen miles over in a south-east and north-west direction, and high in the middle. Long. 167° 38′ E., lat. 22° 38′ S.

PINET (Antony Du), lord of Noroy, a native of Besançon, who lived in the sixteenth century. He was strongly attached to the Protestant religion. His books, entitled La Conformité des Eglises Reformés de France, de l'Eglise primitive, Lyons, 1564, in 8vo.; and the notes he added to the French translation of the Fees of the Pope's Chancery, printed at Lyons, in 8vo., 1564, and reprinted at Amsterdam in 1700, in 12mo., plainly discover his sentiments. He published the last-mentioned performance under this title: Taxe des Parties casuelles de la Boutique du Pape, in Latin and French, with some notes taken from decrees, councils, and canons, to ascertain the discipline anciently observed in the church. His translation of Pliny's Natural History, with notes, printed at Lyons, in 2 vols. folio, 1566, and at Paris, 1608, was much read. Pinet also published Plans of the principal Fortresses in the World, at Lyons, 1564, in folio.

PIN'FEATHERED, *adj.* Pin and feather. Not fledged; having the feathers yet only beginning to shoot.

We see some raw *pinfeathered* thing
Attempt to mount, and fights and heroes sing;
Who for false quantities was whipt at school.
Dryden.

PINGRE (Alexander Guy), a celebrated French astronomer, born in 1709. He was a zealous advocate for the freedom of the French church, against the bishops: for which he was five times taken up by lettres de cachet. Having made great proficiency in astronomy, he published A Calculation of an Eclipse of the Moon, on the 23d of December, 1749. In 1760 the Academy of Sciences appointed him to observe the transit of Venus. He calculated the eclipses for 1000 years before our Saviour's birth. On the death of M. De Lisle, he was elected geographical astronomer. He translated Manilius's poetical treatise on Astronomy. He afterwards studied botany with success. He died in 1796.

PINGUICULA, butterwort, a genus of the monogynia order and diandria class of plants; natural order twenty-fourth, corydales. There are four species, of which the most remarkable is P. vulgaris, common butterwort, or Yorkshire sanicle, grows commonly on bogs or low moist grounds in England and Scotland. Its leaves are covered with soft, upright, pellucid prickles, secreting a glutinous liquor. The flowers are pale red, purple, or deep violet color, and hairy within. If the fresh gathered leaves of this plant are put into the strainer through which warm milk from the cow is poured, and the milk set by for a day or two to become acescent, it acquires a consistency and tenacity, and neither whey nor cream separate from it. In this state it is an extremely grateful food, and, as such, is used by the inhabitants of the north of Sweden. There is no further occasion to have recourse to the leaves; for half a spoonful of this prepared milk, mixed with fresh warm milk, will convert it to its own nature, and this again will change another quantity of fresh milk, and so on without end. The juice of the leaves kills lice; and the common people use it to cure the cracks or chops in cows' udders. The plant is generally supposed injurious to sheep, by occasioning in them that disease called the rot. But from experiments made on purpose, and conducted with accuracy, it appears that neither sheep, cows, goats, horses, or swine, will feed upon this plant. Wherever this plant is found it is a certain indication of a boggy soil. The Laplanders make an agreeable food with the milk of the rein-deer by the fresh leaves of this plant, like that of the Swedes with the milk of cows, and with the same consequences.

PIN'GUID, *adj.* Lat. *pinguis.* Fat; unctuous. Little used.

Some clays are more *pinguid*, and others more slippery; yet all are very tenacious of water on the surface. *Mortimer.*

PINGUIN, or PENGUIN, in ornithology, a genus of birds of the order of palmipedes; distinguished by Latham by the following characters: the bill is strong, straight, more or less bending towards the point, and furrowed on the sides; the nostrils are linear, and placed in the furrows; the tongue is covered with strong spines, pointing backwards; the wings are small, very like fins, and covered with no longer feathers than the rest of the body, and therefore useless in flight; the body is clothed with thick short feathers, having broad shafts, and placed as compactly as the scales of fishes; the legs are short, thick, and placed very near the vent; the toes are four, all placed forwards, the interior are loose, and the rest are webbed; the tail is very stiff, consisting of broad shafts scarcely webbed. Pinguins are inhabitants of south latitudes only; being, as far as is yet known, found only on the coasts of South America, from Port Desire to the Straits of Magellan; and Frezier says they are found on the west coast as high as Conception. In Africa they seem to be unknown, except on a small isle near the Cape of Good Hope, which takes its name from them. They are found in vast numbers on land during the breeding season; for they seldom come on shore but at that time: they form burrows under ground like rabbits; and the isles they frequent are perfectly undermined by them. Their attitude on land is quite erect, and on that account they have been compared by some to pygmies, by others to children with white bibs. They are very tame, and may be driven like a flock of sheep. In water they are remarkably active, and swim with vast strength, assisted by their wings, which serve instead of fins. Their food in general is fish; not but that they will eat grass like geese. Mr. Latham remarks that this genus appears to hold the same place in the southern division of the earth that the awks do in the northern; and that, however authors may differ in opinion on this head, they ought not to be confounded with one another. The pinguin is never seen but in the temperate and frigid zones south of the equator, while the awk only appears in the parallel latitudes north of the equator; for neither of these genera have yet been observed within the tropics. Forster, in his voyage (vol. I. page 92), says he saw one for the first time in lat. 48° S., nor are they ever met wit.

nearer than 40° S. (Id. Introd. Disc. on Pinguins, Comment. Got. vol. III.). The wings of the pinguin are scarcely any thing else than mere fins, while the awk has real wings and gills, though they be but small. The former has four toes on each foot, the latter only three. While swimming, the pinguin sinks wholly above the breast, the head and neck only appearing out of the water, while the awk, like most other birds, swims on the surface. There are several other peculiarities which serve to distinguish the two genera, but what we have mentioned are doubtless sufficient. 'The bodies of the pinguin tribe,' says our author, 'are commonly so well and closely covered with feathers that no wet can penetrate; and, as they are in general excessively fat, these circumstances united secure them from cold. They have often been found 700 leagues from land; and frequently on the mountains of ice, on which they seem to ascend without difficulty, as the soles of their feet are very rough and suited to the purpose.' Mr. Latham enumerates nine different species of this genus, besides two varieties of the black-footed pinguin or diomedea.

1. P. antarctic is about twenty-five inches long, and weighs about eleven pounds and a half. The bill is upwards of two inches and three-quarters long; the upper parts of the body are black, the under are glossy white; beneath the chin there is a narrow streak of a blackish color, passing backward towards the hind head, a little bent about the region of the ears; the wings are much the same as in the other species; the tail is cuneiform: the feathers, or rather bristles, of which it is composed, are black, and in number thirty-two; the legs are of a flesh color, and the soles of the feet are black. This species, says Latham, inhabits the South Sea, from 48° to the antarctic circle; and is frequently found on the ice on mountains and islands, which it ascends; it is a pretty numerous species. Our last voyagers found them in plenty in the Isle of Desolation. In an island they touched at not greatly distant, the rocks were almost covered with the pinguins and shags; the first probably of this sort.

2. P. black-footed, or diomedea demersa. See Diomedea.

3. P. collared is a very little less than the Papuan, being eighteen inches long. The bill which is black is similar to that of the Patagonian pinguin; the irides are black; the eye is surrounded with a bare skin of a blood color, of an oval shape, and three times as large as the eye itself; the head, throat, hind part of the neck and sides, back, wings, and tail, are all black; the fore part of the neck, breast, belly, and thighs, are white, extending round the neck, where the white begins like a collar, except that it does not quite meet at the back part; the legs are black. This species inhabits New Guinea. It was also seen by Dr. Forster near Kerguelen's Land; and again on two isles adjoining to the island of South Georgia.

4. P. crested. It is a very beautiful species, twenty-three inches long; the bill is three inches long, and of a red color, with a dark furrow running along on each side to the tip; the upper mandible is curved at the end, the under is obtuse; the irides are of a dull red; the head, neck, back, and sides are black. Over each eye there is a stripe of pale yellow feathers, which lengthens into a crest behind, nearly four inches long; the feathers on each side of the head, above this stripe, are longer than the rest, and stand upward, while those of the crest are decumbent, but can be erected on each side at pleasure; the wings, or rather fins, are black on the outside, edged with white; on the inside they are white; the breasts and all the under parts are also white; the legs are orange, and the claws are dusky. The female has a streak of pale yellow over the eye, but it is not prolonged into a crest behind as in the male. This species inhabits Falkland Islands, and was likewise met with in Kerguelen's Land, or Isle of Desolation, as well as at Van Diemen's Land, and New Holland, particularly in Adventure Bay. They are called hopping pinguins and jumping jacks, from their action of leaping quite out of the water, on meeting with the least obstacle, for three or four feet at least: and indeed they often do this, without any seeming cause unless to advance. This species seems to have a greater air of liveliness in its countenance than others, yet it is in fact a very stupid bird, so much so as to suffer itself to be knocked on the head with a stick when on land. Forster says he found them difficult to kill; and, when provoked, he adds, they ran at the sailors in flocks, and pecked their legs and spoiled their clothes. When angered, too, they erect their crests in a beautiful manner. These birds make their nests among those of the pelican tribes, living in tolerable harmony with them; and lay seldom more than one egg, which is white, and larger than that of a duck. They are mostly seen by themselves, seldom mixing with other pinguins. They are often met with in great numbers on the outer shores, where they have been bred. They frequently suffer themselves to be taken by the hand. The females lay their eggs in burrows, which they easily form with their bills, throwing out the dirt with their feet. In these holes the eggs are deposited on the bare earth. The time of sitting is in October; but some of the species, especially in the colder parts, do not sit till December, or even January. How long they sit is not known.

5. P. Magellanic is about the size of the antarctic pinguin. They are about two feet and sometimes two feet and a half long, and weigh eleven pounds. The bill is black, having a transverse band across near its tip; the head and neck are black, except a few markings here and there; the upper parts of the body and wings are of the same color; the under parts of both are white from the breast, except a narrow band of black passing at a little distance within the white on the breast, and downwards on each side, beneath the wings quite to the thighs; the legs are of a reddish color, irregularly spotted on the thighs; and the claws are black. This species, which is very numerous, inhabits the Straits of Magellan, Staten Land, Terra del Fuego, and Falkland Islands. Far from being timid, these birds will often attack a man and peck his legs. As food they are not at all unpalatable. They

often mix with sea-wolves among the rushes, burrowing in holes like a fox. They swim with prodigious swiftness. They lay their eggs in collective bodies, resorting in incredible numbers to certain spots, which their long residence has freed from grass, and to which were given the name of towns. Penrose observes, that they composed their nests of mud, a foot in height, and placed as near one another as may be. 'The eggs,' says he, 'are rather larger than those of a goose, and laid in pairs. When we took them once, and sometimes twice in a season, they were as often replaced by the birds; but prudence would not permit us to plunder too far, lest a supply in the next year's brood might be prevented.' They lay some time in November, driving away the albatrosses, which have hatched their young in turn before them. The eggs were palatable food, and were preserved good for three or four months.

6. P. Papuan is about two feet and a half long, being a little bigger than the Cape pinguin. This species inhabits the Isle of Papos, or New Guinea, and has been met with at Falkland Isles and Kerguelen's Land. It is often found among the Patagonian pinguins.

7. P. Patagonian is so named, not only because it is found on that coast, but also because it exceeds in bulk the common pinguins as much as the people are said to do the common race of men. It was first discovered by captain Macbride who brought one of them from Falkland Islands, off the Straits of Magellan. The length of the stuffed skin of this bird measured four feet three inches, and the bulk of the body seemed to exceed that of a swan. The bill was four inches and a half long, slender, straight, bending on the end of the upper mandible, with no nostrils. The tongue half the length of the bill, and singularly armed with strong sharp spikes pointing backwards. The plumage is most remarkable, the feathers lying over one another with the compactness of the scales of a fish, their texture equally extraordinary, the shafts broad and very thin, the veins unwebbed; the head, throat, and hind part of the neck are of a deep brown color; from each side of the head to the neck are two lines of bright yellow, broad above, narrow beneath, and uniting half way down; from thence the same color widens towards the breast, fading away until it is lost in pure white, of which color is the whole underside of the body, a dusky line dividing it from the color of the upper part. The whole back is of a very deep ash color, almost dusky, but the end of each feather is marked with a blue spot, those about the junction of the wings larger and paler than the other. The wings are in this species, as in all the others, extremely short in respect to the size of the bird; hang down, and have the appearance of fins, whose office they perform; their length is only fourteen inches; on the outside they are dusky, and covered with scale-like feathers, or at best with such whose shafts are so broad and flat as scarce to be distinguished from scales; those on the ridge of the wings consisting entirely of shaft; the larger, or quill feathers, have some very short webs. The tail consists of thirty brown feathers, or rather thin shafts, resembling split whalebone, flat on the upper side, concave on the under, and the webs short, unconnected, and bristly. From the knees to the end of the claws six inches, covered with strong pentangular black scales; the fore toe scarce an inch long, and the others so remarkably short as to evince the necessity of that strength of the tail, which seems intended as a support to the bird in its erect attitude, in the same manner as that of the woodpecker is when it clings to the sides of trees. Between the toes is a strong semilunar membrane, continued up even part of the claws, the middle claw is near an inch long, and the inner edge very sharp and thin, the interior toe is small, and placed very high. The skin is extremely tough and thick; which, with the closeness of the feathers, guards it effectually in the water. This species, which was first met with in Falkland Islands, has since been seen in Kerguelen's Land, New Georgia, and New Guinea. M. Bougainville caught one, which soon became so tame as to follow and know the person who had care of it. It fed on flesh, fish, and bread, but after a time grew lean, pined away, and died. The chief food when at large is thought to be fish; the remains of which, as well as crabs, shell-fish, and molluscæ, were found in the stomach. This species is the fattest of the tribe; and therefore most so in January when they moult. They are supposed to lay and sit in October. They are met with in the most deserted places. Their flesh is black, though not very unpalatable. This has been considered as a solitary species, but has now and then been met with in considerable flocks. They are found in the same places as the Papuan pinguins, and not unfrequently mixed with them; but in general show a disposition of associating with their own species.

8. P. red-footed, or phaeton demersus. See Phaeton.

9. P. small, or, as Latham calls it, the little pinguin, is about the size of a teal, being fifteen inches long. The bill, which is of a dusky color, is about one inch and a half long, and shaped like that of the phaeton demersus. The upper parts of the bird from the head to the tail appear to be of a cinereous blue color, of which color are the ends of the feathers; the base of them, however, is brown black, and the shafts of each of the same color, the under parts from chin to vent are white, the wings are dusky above and white beneath; the tail, which is exceedingly short, consists of sixteen stiff feathers, which are scarcely perceptible, the legs are of a dull-red color, the webs are dusty, and the claws are black. This species is pretty common among the rocks on the south parts of New Zealand, but they are most frequent at Dusky Bay. They make deep burrows on the sides of the hills, in which they lay their eggs. These holes are so thick in some parts, that a person is scarcely able to walk three or four steps without falling into one of them up to the knees. The inhabitants of Queen Charlotte's Sound kill them with sticks, and, after skinning them, esteem the flesh as good food. At New Zealand they are named korora. 'These birds,' says Latham, 'I have found to vary both in size and color. Some are much smaller than others, quite black above, and measure only thir-

teen inches in length; others are rather larger, and of a plain lead-color on the upper parts, and the wings black, though all are white or nearly so beneath. The legs in these two last are marked with black at the ends of the toes, and the claws are black.

PINGUIS, a river of Mysia, which runs into the Danube.—Plin. iii. c. 26.

PIN'ION, *n. s.* & *v. a.* Fr. *pignon*; Lat. *penna*. The joint of a wing remotest from the body. Shakspeare uses it for a feather or quill of the wing; the tooth of a wheel; a fetter or shackle: to bind the wings or arms; to shackle; bind to.

How oft do they with golden *pinions* cleave
The flitting skies, like flying pursuivant! *Spenser.*
He is pluckt, when hither
He sends so poor a *pinion* of his wing. *Shakspeare.*

Know, that I will not wait *pinioned* at your master's court; rather make my country's high pyramids my gibbet, and hang me up in chains.
Id. Antony and Cleopatra.

Whereas they have sacrificed to themselves, they become sacrifices to the inconstancy of fortune, whose wings they thought by their self-wisdom to have *pinioned*. *Bacon.*

O loose this frame, this knot of man untie!
That my free soul may use her wing,
Which now is *pinioned* with mortality,
As an entangled, hampered thing. *Herbert.*

A second spear sent with equal force,
His right arm pierced, and holding on, bereft
His use of both, and *pinioned* down his left.
Dryden.

In vain from chains and fetters free,
The great man boasts of liberty;
He's *pinioned* up by formal rules of state.
Norris.

The God, who mounts the winged winds,
Fast to his feet, the golden *pinions* binds,
That high through fields of air his flight sustain.
Pope.

So by each bard an alderman shall sit,
A heavy lord shall hang at every wit;
And, while on fame's triumphant car they ride,
Some slave of mine be *pinioned* to their side. *Id.*

Though fear should lend him *pinions* like the wind,
Yet swifter fate will seize him from behind. *Swift.*

Avaunt, away! the cruel sway,
Tyrannic man's dominion;
The sportman's joy, the murd'ring cry,
The flutt'ring, gory *pinion*. *Burns.*

PINION, in mechanics, an arbor or spindle in the body whereof are several notches, which catch the teeth of a wheel that serves to turn it round, or it is a lesser wheel that plays in the teeth of a larger. See CLOCK-WORK.

PINITE, in mineralogy, micarelle of Kirwan. Color blackish-green. Massive, in lamellar concretions, and crystallised in an equiangular six-sided prism; in the same figure truncated or bevelled, and in a rectangular four-sided prism. Cleavage shining; lustre resinous. Fracture uneven. Opaque. Soft. Sectile; frangible, and not flexible. Feels somewhat greasy. Specific gravity 2·95. Infusible. Its constituents are, silica 29·5, alumina 63·75, oxide of iron 6·75.—Klaproth. It is found in the granite of St. Michael's Mount, Cornwall; in porphyry in Glenglowe and Blair-Gowrie; at St. Pardoux in Auvergne, &c.

'Two different analyses of pinite have been made known,' says Dr. Gmelin of Tubingen, in a letter in Dr. Brewster's Journal, 'the one by Klaproth, of pinite from the Pinistollen, the other by Drapier, of pinite from Auvergne. They found it to consist of the following ingredients:—

	Klaproth.	Drapier.
Silica	29·50	46·0
Alumina,	63·75	42·0
Oxide of iron	6·75	2·5
	100·00	90·5

Klaproth himself seems not to have put much confidence in his analysis, which was made at an early period, as he has not admitted it into his contributions. The mineralogical affinity which was presumed to exist between pinite and mica, having thus received no confirmation from chemistry, I imagined that a repetition of its analysis would not be superfluous. For this investigation, I made choice of the pinite of St. Pardoux, it being the only kind I could procure in sufficient quantity.

'Its specific gravity was found = 2·7575 + 6½ R. It is asserted in almost all mineralogical works that the pinite cannot be melted before the blowpipe: this assertion is founded upon the examination of Klaproth, made upon the pinite of Pinistollen. I have had no opportunity of examining that variety under the blowpipe; but the pinite of St. Pardoux melts on the edges into a glass full of blisters, when thin splinters of it are presented to the flame, although it does not melt into a globule. I have observed in general the same reactions as those which have been described by professor Berzelius, in his treatise on the Blowpipe; and I have only one circumstance to add, which, in so far as regards the geological relations of pinite, seems to deserve some attention. The pinite, when heated in a glass phial, gives out water of a disagreeable empyreumatic smell, which instantly blues reddened litmus, and therefore contains ammonia. It cannot be determined whether this ammonia is ready formed in the mineral, or is rather a product of the decomposition of some animal matter contained in it: the latter, however, would seem to be the more probable conjecture. It may be observed that pinite never occurs in fresh rocks, but always, as for instance in Auvergne, in a decomposed granite, upon which the volcanic mountains of that country rest; and upon this occasion I beg leave to observe that I have discovered a considerable quantity of ammonia in the natrolite of Hohentwiel, and in the porphyry-slate itself, in which the natrolite is found in veins.—Gilbert's Annalen, 1820, No. iv. p. 367.

Analysis.—*a.* 1·49 grains of pinite, in coarse pieces, were reduced by ignition to 1·459 grains; 100 parts, therefore, would experience a loss of 1·410. *b.* 2·5 grains of pinite, after having been reduced to an impalpable powder, ware mixed with 12·5 grains of carbonate of barytes, and ignited; the mass cohered loosely, and assumed a green color. When dissolved in muriatic acid,

chlorine was evolved. Silica, separated in the ordinary way, weighed, after ignition, 1·38 grains = 55·200 per cent. *c*. The liquor was now precipitated by carbonate of ammonia; the precipitate which fell down was separated by the filter, and well washed. The solution was then evaporated to dryness, and the dry mass fused. Alcohol and a little muriatic acid were poured upon the fused mass, and the alcohol set on fire; but there appeared nothing of a green or purple color, a circumstance by which the absence of boracic acid and lithium is proved. *d*. The muriate of alkali, converted into a neutral sulphate, weighed 0·387 grains; when dissolved in water, 0·0191 grains. Silica = 0·764 per cent. were left undissolved. The sulphate was now converted into a carbonate by means of acetate of lead, which was dissolved in water, leaving a small residue of oxide of manganese. The solution was saturated by muriatic acid, and evaporated, in in order to drive off the excess of acid. The muriatic salt was dissolved in a little water, and mixed with a concentrated solution of muriate of platina. The precipitate was washed with a small quantity of water. The solution which passed through the filter was mixed with some sulphuric acid, evaporated, and exposed to an intense heat. The sulphate was separated from the metallic platina by means of water, and put aside for crystallisation. There were formed crystals of sulphate of soda, which effloresced perfectly on exposure to the atmosphere, and weighed in this state 0·022 grains. This quantity being deduced from the whole quantity of the salt (0·387 grains), there remain for the sulphate of potassa 0·365 grains. 2·5 grains of pinite contain, therefore, 0·19735 grains of potassa = 7·894 per cent., and 0·00964 grains of soda = 0·386 per cent. *e*. The precipitate formed by carbonate of ammonia (*c*) was dissolved in muriatic acid, and the barytes precipitated by sulphuric acid. The filtered liquor was then evaporated, again dissolved in water, mixed with caustic ammonia, and quickly filtered. The filtered liquor, when evaporated, deposited alumina, which, after ignition, weighed 0·038 grains = 1·52 per cent. Oxalate of ammonia produced in this liquor a very slight precipitate, which could not be weighed. When boiled with carbonate of potassa, no precipitate fell down. *f*. The precipitate thrown down by caustic ammonia (*e*) was dissolved in muriatic acid, and boiled with an excess of caustic potassa. The alkaline solution was supersaturated by muriatic acid, and the alumina then precipitated by carbonate of ammonia. It weighed, after ignition, 0·899 grains, = 23·960 per cent. *g*. The residue (in *f*) left undissolved by potassa was dissolved in muriatic acid, boiled with nitric acid, and the iron thrown down by succinate of ammonia. The oxide of iron weighed 0·1378 grains = 5·212 per cent. *h*. The iron having been separated, the liquor was boiled with subcarbonate of potassa, by which magnesia was precipitated, containing a quantity of oxide of manganese. It weighed, after ignition, 0·094 grains = 3·760 per cent.

The pinite of St. Pardoux is therefore composed of

Silica,	55·200 (*b*) 0·764 (*d*)	55·964
Alumina, (With traces of lime),	23·960 1·520	25·480
Potassa,		7·894 (*d*)
Soda,		0·386 (*d*)
Oxide of iron,		5·512 (*g*)
Magnesia, with oxide of manganese,		3·760 (*h*)
Water, with an animal matter,		1·410 (*a*)
		100·406

PINK, *n. s.* Fr. *pince*; from Belg. *pink*, an eye: whence the French word *œillet*, says Johnson: from French *pence*, a point, because of its pointed leaves.—Thomson. A small fragrant flower of the gilliflower kind; a small eye; a color; any thing strikingly excellent

> Come, thou monarch of the vine,
> Plumpy Bacchus, with *pink* eyne,
> In thy vats our cares be drowned.
> *Shakspeare.*

I am the very *pink* of courtesy *Id.*

In May and June come *pinks* of all sorts; especially the blush *pink*. *Bacon's Essays.*

The sea-hedgehog is enclosed in a round shell, handsomely wrought and *pinked*. *Carew.*

Pink is very susceptible of the other colours by the mixture; if you mix brown-red with it, you will make it a very earthy colour. *Dryden's Dufresnoy.*

A hungry fox lay winking and *pinking*, as if he had sore eyes. *L'Estrange.*

> Happy the climate where the beau
> Wears the same suit for use and show;
> And at a small expence your wife,
> If once well *pinked*, is clothed for life. *Prior.*

> Then let Crispino, who was ne'er refused
> The justice yet of being well abused,
> With patience wait; and be content to reign
> The *pink* of puppies in some future strain.
> *Young.*

PINK, *n. s.* Fr. *pinque*. A kind of heavy narrow-sterned ship.

> This *pink* is one of Cupid's carriers;
> Give fire, she is my prize. *Shakspeare.*

PINK, Fr. pinque, a name given to a ship with a very narrow stern. Those used in the Mediterranean Sea differ from the xebecs only in being more lofty, and not sharp in the bottom; they are vessels of burden, have three masts, and carry lateen sails. All vessels, however small, whose sterns are very narrow, are called pink-sterned.

PINK, in botany. See DIANTHUS.

PINK, INDIAN, the English name of three species of different genera; viz. dianthus, ipomea, and lonicera.

PINK, SEA, a species of statice.

PINKERTON (John), F. S. A., a miscellaneous writer, was born in Edinburgh, February 13th, 1758, and was the third son of James Pinkerton, a dealer in hair, but descended of a respectable family. After acquiring the rudiments of education in the suburbs of the Scottish metropolis, he was removed, in 1764, to a school of a respectable character, at Lanark, kept by a brother-in-law of Thomson, the poet; and was then articled to a writer to the signet, in whose office he continued five years. Here he imbibed a taste for poetry, of which the first fruits appeared in 1776, in an elegy called Craigmiller Castle. On

the death of his father, in 1780, he came to London, where he settled the following year, and published a volume of miscellaneous poetry, under the title of Rhymes, with dissertations on the Oral Tradition of Poetry, and on the Tragic Ballad, prefixed. This he followed up the succeeding year by two others; one in quarto containing Dithyrambic Odes, &c., the other entitled Tales in Verse. A passion for collecting medals, excited in his boyish days by his coming into possession of a rare one of the emperor Constantine, drew his attention to the imperfections of all books on the subject, and led him to draw up his excellent essay on Medals, printed in 1784, in 2 vols. 8vo.; a compilation in which he was much indebted to the assistance of Mr. Douce. Mr. Pinkerton published in 1785 Letters on Literature, under the assumed name of Heron, in which he recommends a new and very fantastical system of orthography. This book, however, obtained him the acquaintance of Horace Walpole, of whose witticisms, &c., he published a collection, after his decease, under the title of Walpoliana, 2 vols. 18mo. In 1787 appeared the Treasury of Wit, 2 vols. 12mo., under the fictitious name of Bennet; Dissertation on the Origin and Progress of the Scythians, or Goths, being an Introduction to the Ancient and Modern History of Europe; A Collection of Latin Lives of Scottish Saints, 8vo. in 1789, now scarce; an edition of Barbour's Old Scottish poem, the Bruce, 3 vols. 8vo. in the same year; the Medallic History of England, 4to.; A Enquiry into the History of Scotland, preceding the reign of Malcolm III., 2 vols. 8vo. 1789, reprinted, with additions, 1795; Scottish Poems, reprinted from scarce editions, 3 vols. 8vo.; Iconographia Scotica, or Portraits of Illustrious Personages of Scotland, with notes, 2 vols. 8vo. 1795--1797; The Scottish Gallery, 8vo. 1799; Modern Geography, digested on a New Plan, 2 vols. 4to. 1802, reprinted 3 vols. 1807; General Collection of Voyages and Travels, 19 vols. 4to.; Recollections of Paris, 2 vols. 8vo.; New Modern Atlas, in parts, 1809; and Petralogy, or a Treatise on Rocks, 2 vols. 8vo. 1811; his last original work. Mr. Pinkerton, in his later years, resided almost entirely at Paris, whither he first proceeded in 1806, and where he died March 10th, 1826.

PIN'MONEY, *n. s.* Pin and money. Money allowed to a wife for her private expenses without account.

The woman must find out something else to mortgage, when her *pinmoney* is gone. *Addison.*

PINNA, in ancient geography, a town of Italy, south of Picenum, at the mouth of the Matrinus, Sil. 8, v. 518.

Pinna, in zoology, a genus belonging to the order of vermes testacea. The animal is a slug. The shell is bivalve, fragile, and furnished with a beard, gapes at one end, the valves hinge without a tooth. They inhabit the coasts of Provence, Italy, and the Indian Ocean. P. marina, the largest and most remarkable species, inhabits the Mediterranean. It is blind, as are all of the genus; but furnished with very strong calcareous valves. The scuttle-fish (sepia), an inhabitant of the same sea, is a deadly foe to this animal. As soon as the pinna opens its shell, he rushes upon her like a lion, and would always devour her, but for another animal of the crab kind naked like the hermit, and very quick-sighted. This cancer or crab the pinna receives into her covering; and, when she opens her valve in quest of food, lets him out to look for prey. During this the scuttle-fish approaches, the crab returns with the utmost speed and anxiety to his hostess, who being thus warned of the danger, shuts her doors, and keeps out the enemy. Dr. Hasselquist, in his voyage towards Palestine, beheld this curious phenomenon, which, though well known to the ancients, had escaped the moderns. Aristotle (Hist. lib. 5, c. 15), and Pliny (lib. 9, 51, and 66), confirm the facts above set forth. The pinnæ marinæ differ less from mussels in the size of their shells than in the fineness and number of certain brown threads which attach them to the rocks, hold them in a fixed situation, secure them from the rolling of the waves, especially in tempests, and assist them in laying hold of slime. See Mytilus. These threads, M. de Reaumur says, are nearly as fine and beautiful as silk from the silk worm, and hence calls them the silk-worms of the sea. Stuffs, and several kinds of beautiful manufacture, are made of them at Palermo; in many places they are the chief object of fishing, and become a silk proper for many purposes. It requires a considerable number of the pinnæ marinæ for one pair of stockings. The thread is so fine that a pair of stockings made of it can be easily contained in a snuff-box of an ordinary size. A pair of men's gloves of this thread lately cost thirteen carlinis, women's gloves eighteen, pair of stockings six ducats, waistcoat thirty, and coat 100 ducats. The men who are employed in fishing up the pinna marina, say that it is necessary to break the tuft of threads. They are fished up at Toulon, from the depth of fifteen, twenty, and sometimes more than thirty feet, with an instrument called a cramp, a kind of fork of iron, of which the prongs are perpendicular with respect to the handle. Each of them is about eight feet long, and there is a space between them of about six inches. The tuft of silk issues directly from the body of the animal; it comes from the shell at the place where it opens, about four or five inches from the summit or point in the large pinnæ. M. de Reaumur (Mem. d l'Acad. des Sciences, 1711, p. 216, and 1717, p. 177,) considers the pinna as the most proper of all shell-fish to elucidate the formation of pearls. It produces many of them of different colors, as gray or lead colored, red, and some of a blackish color, and in the form of a pear. The animal which lodges in the pinna marina rarely shows itself, because the valves are seldom opened. Its head is below, its largest extremity opposite; it is kept in the shell by four vigorous muscles, placed at the extremities of the valves; the shell has no hinges, but a flat and blackish ligament, which is equal in length to one-half of the shell. M. d'Argenville distinguishes three kinds of the pinnæ:—1. P. M. astura of the Venetians is large, red within, and has reddish mother-of-pearl, similar to the substance of the shell itself. Some of these shells weigh nearly

fifteen pounds. 2. P. M. papyracea, is smaller, slender, papyraceous, of the color of horn, a little shaded with pale red. 3. P. M. perna, is adorned with points in the channels of the shell, but what is singular, the edges of the shell are thicker at the openings than at the joining of the valves.

PIN'NACE, *n. s.* Fr. *pinnasse*; Ital. *pinnacia*; Span. *pinaca*. A boat belonging to a ship of war; a small sloop or bark attending a larger ship.

For fear of the Turks' great fleet, we came by night in a small *pinnace* to Rhodes. *Knolles's History.*

Whilst our *pinnace* anchors in the Downs,
Here shall they make their ransom on the sand. *Shakspeare.*

I discharged a bark, taken by one of my *pinnaces*, coming from cape Blanch. *Raleigh's Apology.*

Thus to ballast love,
I saw I had love's *pinnace* overfraught. *Donne.*

I sent a *pinnace* or post of advice, to make a discovery of the coast, before I adventured my greater ship. *Spelman.*

He cut down wood, and made a *pinnace*, and entered the South-sea. *Heylin.*

A *pinnace* anchors in a craggy bay. *Pope.*

Swift as a swallow sweeps the liquid way,
The winged *pinnace* shot along the sea. *Pope.*

Pinnace, Fr. pinnace, sorte d'embarcation mâtée en goëlette, a small vessel, navigated with oars and sails, and having generally two masts, rigged like those of a schooner. They are chiefly used for procuring intelligence, and for landing of men, &c.

Pinnace, Fr. pinnace ou chaloupe à huit avirons, is also a boat, usually rowed with eight oars.

PIN'NACLE, *n. s.* Fr. *pinnacle*; Lat. *pinna*. A turret or elevation above the rest of a building; a high point.

My letting some men go up to the *pinnacle* of the temple, was a temptation to them to cast me down headlong. *King Charles.*

He who desires only heaven, laughs at that enchantment which engages men to climb a tottering *pinnacle*, where the standing is uneasy and the fall deadly. *Decay of Piety.*

The slippery tops of human state,
The gilded *pinnacles* of fate. *Cowley.*

He took up ship-money where Noy left it, and, being a judge, carried it up to that *pinnacle*, fr m whence he almost broke his neck. *Clarendon.*

Some metropolis
With gliste.ing spires and *pinnacles* adorned. *Milton.*

He then led me to the highest *pinnacle* of the rock, and placing me on the top of it, Cast thy eyes eastward, said he, and tell me what thou seest. *Spectator.*

Pinnacle, in architecture, the top of a house, terminating in a point. This kind of roof among the ancients was appropriated to temples; their ordinary roofs were all flat, or made in the platform way.

Pinnacle Island, an island of the South Pacific Ocean, so named by Captain Cook in 1778. It is about fourteen miles from north to south, the shore every where broken and uneven, and forming bays bounded by rugged cliffs. Long. 186° 40 E., lat. 60° 25′ N.

PINNATED Leaves, in botany. See Botany.

PINNATIFIDUM Folium. See Botany.

PINNATIPEDES, Lat. from pinna, a fin, and pes, a foot, in ornithology, an order of birds that have pinnated feet, or are fin-footed. It is the eighth order both in the Linnean system and Mr. Latham's; but the fourth according to Dr. Gmelin's arrangement, which is followed by Mr. Kerr; who characterises them thus:—The bill, body, and mode of life, in the birds of this order, resemble those of the waders. The thighs are likewise naked for the lower half, and the feet are fitted for wading in marshes, all the toes being divided; but the toes are edged on each side with a membrane for their whole length These birds mostly live in pairs while breeding, and construct very large nests of various leaves and grass in their marshy haunts. See Grallæ, and Waders. There are only three genera according to all these ornithologists. They are figured in Latham.

PIN'NER, *n. s.* From pinna or pinion. The lappet of a head-dress, which flies loose.

An antiquary will scorn to mention a *pinner* or a night-rail, but will talk on the vitta. *Addison.*

Her goodly countenance I've seen,
Set off with kerchief starched, and *pinners* clean. *Gay.*

PINNOPHYLAX, Pinnoteres, or Pinnoterus, a kind of crab-fish, furnished with very good eyes. It is said to be the companion of the pinna marina. They live and lodge together in the same shell, which belongs to the latter. When it has occasion to eat, it opens its valves and sends out its faithful purveyor to procure food. If during their labor the pinnoterus perceives the polypus, it immediately returns to warn its blind friend of the danger, when, by shutting its valves, it escapes the rage of its enemy; but, when the pinnoterus loads itself with booty without molestation, it makes a gentle noise at the opening of the shell, and when admitted the two friends feast on the fruits of its industry. See Pinna.

PINOS, a low island of the Atlantic, on the coast of Darien, 115 miles E. S. E. of Reo Vilo: also an island of the Atlantic Ocean, near the south coast of Cuba, from which it is separated by a channel sixteen leagues long, and six wide. It is forty-two miles long and thirty-four broad, and abounds in pastures and large trees; also in goats and other animals. It has several very well sheltered roads, and is inhabited by a few fishermen. Long. 82° 45′ W., lat. 21° 38′ N.

PINS, Belaying, in ships (chevillots de fer, ou de bois, pour amarrer des manœuvres, Fr.), are pieces of wood, or iron, fixed in a rank for making fast the small running-rigging.

Pins and Chains, for securing the bars in the capstan, are iron pins connected with small chains, which are fastened to the drum-head of the capstan by means of staples.

PINSK, a trading town of Russian Lithuania, in the government of Minsk, surrounded by marshes. It is the see of a bishop of the united Greek church; but a number of the inhabitants are Jews. Its chief manufacture is leather.

Population 4500. Eighty-four miles east of Brzeze, and 100 S. S. E. of Grodno.

PINT, *n. s.* Sax. pınt; Fr. *pinte;* low Lat. *pinta.* Half a quart; in medicine, twelve ounces; a liquid measure.

Well, you'll not believe me generous, till I crack half a *pint* with you at my own charges. *Dryden.*

Pint (pinta), a vessel, or measure, used in estimating the quantity of liquids, and even sometimes of dry things. Budæus derives the word from the Greek πινθα; others from the German pint, a little measure of wine; Nicod from the Greek πινειν, to drink. The English pint is two-fold; the one for wine measure, the other for beer and ale-measure. See Weights and Measures. The Scotch pint is four times as large.

PINTADO, or afra avis, in ornithology, a name given by the ancient Roman authors to the Guinea-hen.

PINTIA, an ancient town of Spain, supposed to have been on the site of Valladolid.

PINTLES, Fr. éguillots de gouvernail, a sort of small mixed metal bolts, fastened upon the back part of the rudder, with their points downwards, in order to enter into, and rest upon the braces, fixed on the stern-post to hang the rudder.

PINTOR (Peter), a native of Valentia in Spain, born in 1426; who was physician to Alexander VI., whom he followed to Rome, where he practised with great success. He wrote two works of considerable merit, 1. Aggregator Sententiarum Doctorum de Curatione in Pestilentiâ, printed at Rome 1499, in folio. 2. De Morbo Fædo et Occulto his Temporibus Affligenti, &c., printed at Rome, 1500, in 4to., black letter; a book extremely scarce, unknown to Luisini and Astruc, and which traces the venereal disease to the year 1496. Pintor died at Rome in 1503, aged eighty-three.

PINTURICCIO (Bernardin), a celebrated Italian painter, born at Perusia in 1454. He was the disciple of Peter Perugino, under whom he became so good an artist that he employed him on many occasions as his assistant. He principally painted history and grotesque; but he also excelled in portraits, among which those of Pope Pius II. and Innocent VIII., of Julia Farnese, Cæsar Borgia, and Isabella queen of Spain, are particularly distinguished. His chief performance is the history of Pius II., painted in ten compartments in the history of Siena; in which undertaking Raphael, then a young man, assisted him so far as to sketch out cartoons of many parts of the composition. His death was occasioned by a singular disappointment. Being employed by the Franciscan monks of Sienna to draw a picture, they gave him a chamber to paint it, which they cleared of all furniture except an old trunk, which he insisted on being also removed, in doing so it broke, and discovered 500 pieces of gold, which the monks gladly seized, and the painter died of vexation at missing the treasure.

PINUS, the pine-tree, a genus of the monodelphia order, and monœcia class of plants; natural order fifty-first, coniferæ. The pine-tree was well known to the ancients, and has been described and celebrated both by their philosophers and poets. Pliny enumerates six species of this genus; and it is mentioned by Virgil in his Eclogues, Georgics, and Æneid; by Horace in his Odes; by Ovid in his Metamorphoses; by Statius; and by Catullus, &c. There are generally reckoned fourteen species of this genus. All of them are propagated by seeds produced in hard woody cones. The way to get the seeds out of these cones is to lay them before a gentle fire, which will cause the cells to open, and then the seeds may be easily taken out. If the cones are kept entire the seeds will remain good for some years; so that the surest way of preserving them is to let them remain in the cones till the time for sowing the seeds. If the cones are kept in a warm place in summer they will open and emit the seeds; but if they are not exposed to the heat they will remain close for a long time. The best season for sowing the pines is about the end of March. When the seeds are sown the place should be covered with nets to keep off the birds; otherwise, when the plants begin to appear with the husk of the seed on the top of them, the birds will peck off the tops, and thus destroy them. The most remarkable species are:—

1. P. abies, or European spruce fir, a native of the northern parts of Europe and of Asia, includes the Norway spruce and long-coned Cornish fir. The former of these is a tree of as much beauty when growing as its timber is valuable when reared. Its growth is naturally upright, and the height it reaches renders it valuable: the white deal, so much coveted by the joiners, &c., is the wood of this tree; and from this fir pitch is drawn. The leaves are dark green; they stand singly on the branches, but the younger shoots are very closely garnished with them. They are very narrow; their ends are pointed; and their beauties excite admiration. The cones are eight or ten inches long, and hang downwards. The better the soil is the faster will the spruce fir grow, though it will thrive very well in most lands. In strong loamy earth it makes a surprising progress; and it delights in fresh lands of all sorts, which never have been worn out by plowing, &c., though it be never so poor. The long-coned Cornish fir differs scarcely in any respect from the Norway spruce, except that the leaves and the cones are larger.

2. P. balsamea, the hemlock fir, a native of Virginia and Canada, possesses as little beauty as any of the fir tribe; though, being rather scarce, it is deemed valuable. It is called by some the yew-leaved fir, from the resemblance of the leaves to those of the yew tree. It is a tree of low growth, with but few branches; and these are long and slender, and spread abroad without order. The leaves do not garnish the branches so plentifully as those of any other species. The cones are very small and rounded; they are about half an inch long; and the scales are loosely arranged. We receive these cones from America, by which we raise the plants. This tree is fond of moist rich ground, and in such soil makes the greatest progress.

3. P. Canadensis, American or Newfoundland spruce fir, a native of Canada, Pennsylvania, and

other parts of North America, includes three varieties: the white, the red, and the black Newfoundland spruce. These, however, differ very little. They are of an upright growth, though they do not shoot so freely or grow so fast with us as the Norway spruce. The leaves are of the same green, and garnish the branches in the same beautiful manner as those of that species; only they are narrower, shorter, and stand closer. The greatest difference is observable in the cones; for these are only about an inch long, and the scales are closely placed. In the cones, indeed, consists the chief difference of these three varieties; those of the white species are of a very light brown color; those of the red more of a nut-brown or reddish color; and those of the black species of a dark or blackish color. This trifling variation, however, is pretty constant in the plants raised from the seeds. The sorts often flower, and produce cones when only about five or six feet high, and look then very beautiful; but this is a sign of weakness in the plant, which it does not often fairly get over.

4. P. cedrus, ranked by Tournefort and others under larix, famous for its duration, is that popularly called by us the cedar of Lebanon, by the ancients cedrus magna, or the great cedar: also cedrelate, κεδρελατη; and sometimes the Phœnician or Syrian cedar, from the country where it grows in its greatest perfection. It is a coniferous evergreen of the bigger sort, bearing large roundish cones of smooth scales, standing erect, the leaves being small, narrow, and thick set. They sometimes counterfeit cedar, by dying wood of a reddish hue: but the smell discovers the cheat, that of true cedar being very aromatic. In some places the wood of the cajou-tree passes under the name of cedar, on account of its reddish color and its aromatic smell, which somewhat resemble that of santal. Cedar wood is reputed almost immortal and incorruptible; a prerogative which it owes chiefly to its bitter taste, which the worms cannot endure. For this reason it was that the ancients used cedar tablets to write upon, especially for things of importance, as appears from that expression of Persius, Et cedro digna locutus. A juice was also drawn from cedar, with which they smeared their books and writings, or other matters, to preserve them from rotting; which is alluded to by Horace: by means of which it was that Numa's books, written on papyrus, were preserved entire to the year 535, as we are informed by Pliny. Solomon's temple, as well as his palace, were both of this wood. That prince gave king Hiram several cities for the cedars he had furnished him on these occasions. Cortes is said to have erected a palace at Mexico, in which were 7000 beams of cedar, most of them 120 feet long, and twelve in circumference, as we are informed by Herrera. Some tell us of a cedar felled in Cyprus 130 feet long and eighteen in diameter. It was used for the main mast in the galley of king Demetrius. Le Bruyn assures us that the two largest he saw on Mount Lebanon measured, one of them fifty-seven palms, and the other forty-seven, in circumference. In the temple of Apollo at Utica there are cedar trees nearly 2000 years old: which yet are nothing to that beam in an oratory of Diana at Seguntum in Spain, said to have been brought thither 200 years before the destruction of Troy. Cedar is of so dry a nature that it will not endure to be fastened with iron nails, from which it usually shrinks; so that they commonly fasten it with pins of the same wood. Hanbury says the wood is not obnoxious to worms; that its oil preserves cloth and books from corruption, and that the saw-dust will even preserve the human body from it. See Cedar. What we find mentioned in Scripture of the lofty cedars can be nowise applicable to the common growth of this tree; since, from the experience we have of those now growing in England, as also from the testimony of several travellers who have visited those few remaining trees on Mount Libanus, they are not inclined to grow very lofty; but on the contrary extend their branches very far; to which the allusion made by the Psalmist agrees very well, when he is describing the flourishing state of a people, and says, 'They shall spread their branches like the cedar-tree.'

5. P. larix, the larch-tree, which the old botanists ranked under larix, with deciduous leaves and oval obtuse cones. It grows naturally upon the Alps and Apennines, and of late has been very much propagated in Britain. It is of quick growth, and the trunk rises to fifty feet or more; the branches are slender, their ends generally hanging downward, and are garnished with long narrow leaves which arise in clusters from one point, spreading open above like the hairs of a painter's brush; they are of a light green, and fall away in autumn. In April the male flowers appear, which are disposed in form of small cones; the female flowers are collected into oval obtuse cones, which in some species have bright purple tops, and in others they are white: these differences are accidental; the cones are about an inch long, obtuse at their points; the scales are smooth, and lie over each other: under each scale there are generally lodged two seeds, which have wings. There are other two varieties of this tree, one of which is a native of America, and the other of Siberia. The cones of the American kind which have been brought to Britain are in general larger than those of the common sort. In Switzerland their houses are covered with boards of this wood cut out a foot square; and as it emits a resinous substance it so diffuses itself into every joint and crevice, and becomes so compact and close, as well as so hardened by the air, as to render the covering proof against all weather. But as such covering for houses would cause great devastation in case of fire, the buildings are confined to a limited distance. The wood, when first laid on the houses, is said to be very white; but this color, in two or three years, is changed, by means of the sun and resin, to a black, which appears like a smooth shining varnish. Of the common larch there are several varieties. The flowers, which it exhibits early in spring, are of a delicate red color; another sort produces white flowers at the same season, and these have a delightful effect among those of the red sort; whilst another, called the black Newfoundland larix, increases the variety, though by an aspect little differing from the others.

There are also larches with greenish flowers, pale red, &c., all of which are accidental varieties from seeds. These varieties are easily distinguished, even when out of blow: the young shoots of the white flowering larch are of the lightest green, and the cones when ripe are nearly white. The red flowering larch has its shoots of a reddish cast, and the cones are of a brown color; whilst the cones and shoots of the black Newfoundland larch are in the same manner proportionally tinged. Their chief beauty consists in the manner of their growth, the nature and beauty of their pencilled leaves and fair flowers; for the cones that succeed them are small, of a whitish, a reddish, or a blackish brown color, and make no figure. The pinus cedrus and pinus larix are propagated by sowing in March, on a bed of light earth exposed to the morning sun. The seed must be covered half an inch thick with fine light earth, and the beds watered at times when the weather is dry. In about six weeks the plants will appear; they must at this time be carefully guarded from the birds, shaded from the sun and winds, and kept very clear of weeds. In the latter end of April following they may be removed into beds of fresh earth, placing them at ten inches distance every way. They are to be kept here two years, and such of them as seem to bend must be tied up to a stake to keep them upright. They may afterwards be planted in the places where they are to remain. They thrive well on the sides of barren hills, and make a very pretty figure there. Dr. Pallas, in his Flora Rossica, informs us that if this tree is burnt, and the wood confined, the internal part of the wood distils copiously a drying reddish gum, a little less glutinous than gum arabic, somewhat of a resinous taste, but wholly soluble in water. At the instigation of M. Kindar, this gum has been sold in the Russian shops under the name of gummi Orenburgensis, but which our author thinks should be called gummi uraliense loricis. It is eaten by the Woguli as a dainty, and is said to be nutritious and antiscorbutic. Some manna was gathered from the green leaves, but it could never be condensed. The Russians use the boletus laricinus as an emetic in intermittents, and to check the leucorrhœa. At Baschir and Siberia the inhabitants sprinkle the dry powder on the wounds of oxen and horses, as a detergent and anthelmintic. The nuts of the pinus cimbra, the same author asserts, are eaten as luxuries in Russia, and are even exported with the same view. The unripe cones give a very fragrant oil, termed balsamic. The inhabitants of Siberia use the tender tops, and even the bark rubbed off in the spring, as an antiscorbutic. The kernels of the nuts of the amygdalus nana give a very pleasing flavor to brandy; and when pressed afford a bitter oil in large quantities. The way of destroying the bitter is by digesting it in the sun with spirit of wine, and it then becomes sweet and extremely agreeable. From the larch-tree is extracted what we erroneously call Venice turpentine. This natural balsam flows at first without incision; when it has done dropping, the people make incisions at about two or three feet from the ground into the trunks of the trees, into which they fix narrow troughs about twenty inches long. The end of these troughs is hollowed like a ladle; and in the middle is a small hole bored for the turpentine to run into the receiver which is placed below it. As the gummy substance runs from the trees it passes along the sloping gutter or trough to the ladle, and thence runs through the holes into the receiver. The people who gather it visit the trees morning and evening from the end of May to September, to collect the turpentine out of the receivers. When it flows out of the tree Venice turpentine is clear like water, and of a yellowish white; but, as it grows older, it thickens and becomes of a citron color. It is procured in the greatest abundance near Lyons, and in the valley of St. Martin near St. Lucern in Switzerland.

6. P. orientalis, the oriental fir, a native of the east, is a low but elegant tree. The leaves are very short, and nearly square. The fruit is exceedingly small, and hangs downward; and the whole tree makes an agreeable variety with the other kinds.

7. P. picea, or yew-leaved fir, is a tall evergreen, and a native of Scotland, Sweden, and Germany. This species includes the silver fir and the balm of Gilead fir. The first of these is a noble upright tree. Mr. Marsham says, 'The tallest trees I have seen were spruce and silver firs in the valleys in Switzerland. I saw several firs in the dockyards in Venice forty yards long; and one of thirty-nine yards was eighteen inches diameter at the small end. I was told they came from Switzerland.' The branches are not very numerous, and the bark is smooth and delicate. The leaves grow singly on the branches, and their ends are slightly indented. Their upper surface is of a fine strong green color, and their under has an ornament of two white lines running lengthwise on each side of the midrib; on account of which silvery look this sort is called the silver fir. The cones are large, and grow erect; and when the warm weather comes on they soon shed their seeds. All who wish to raise this plant should therefore gather the cones before that happens. The balm of Gilead fir has of all the sorts been most coveted, on account of the great fragrance of its leaves; though this is not its only good property; for it is a very beautiful tree, naturally of an upright growth, and the branches are so ornamented with their balmy leaves as to exceed any of the other sorts in beauty. The leaves, which are very closely set on the branches, are broad; and their ends are indented. Their upper surface, when healthy, is of a fine dark-green color, and their under has white lines on each side the midrib lengthwise, nearly like those of the silver fir. These leaves when bruised are very finely scented; and the buds, which smell in the autumn for the next year's shoot, are very ornamental all winter, being turgid, and of a fine brown color: and from these also exudes a kind of fine turpentine, of the same kind of (though heightened) fragrancy. The tree being wounded in any part emits plenty of this turpentine; and Hanbury says, 'it is supposed by many to be the sort from whence the balm of Gilead is taken, which occasions this tree being so called. But this is a mistake; for

the true balm of Gilead is taken from a kind of terebinthus: though I am informed that what has been collected from this tree has been sent over to England from America (where it grows naturally), and often sold in the shops for the true sort.' The silver fir is very hardy, and will grow in any soil or situation, but always makes the greatest progress in rich loamy earth. The balm of Gilead fir must be planted in deep, rich, good earth; nor will it live long in any other. The soil may be a black mould, or of a sandy nature if it be deep enough, and if the roots have room enough to strike freely.

8. P. pinea, or stone pine, is a tall evergreen tree, native of Italy and Spain. It delights in a sandy loam, though like most others it will grow well in almost any land. Respecting the uses of this species, Hanbury tells us that 'the kernels are eatable, and by many preferred to almonds. In Italy they are served up at the table in their desserts. They are exceedingly wholesome, being good for coughs, colds, consumptions, &c., on which account only this tree deserves to be propagated.' Hanbury observes, 'It is a great mistake Mr. Miller has committed, by saying, that seeds kept in the cones will be good and grow if they are sown ten or twelve years after the cones have been gathered from the trees: whereas the seeds of this sort, whether kept in the cones or taken out, are never good after the first year.'

9. P. pineaster, or wild pine, grows naturally in the mountains in Italy, and the south of France. It grows to the size of a large tree; the branches extend to a considerable distance; and while the trees are young they are fully garnished with leaves, especially where they are not so close as to exclude the air from those within; but as they advance in age the branches appear naked, and all those which are situated below become unsightly in a few years; for which reason they are now much less in esteem than formerly. From this species is extracted the common turpentine, much used by farriers, and from which is drawn the oil of that name. The process of making pitch, tar, resin, and turpentine, from these trees, is very familiar. In spring, when the sap is most free in running, they pare off the bark of the pine tree, to make the sap run down into a hole which they cut at the bottom to receive it. In the way, as it runs down, it leaves a white matter like cream, but a little thicker. This is very different from all the kinds of resin and turpentine in use, and it is generally sold to be used in the making of flambeaux instead of white bees' wax. The matter that is received in the hole at the bottom is taken up with ladles, and put in a large basket. A great part of this immediately runs through, and this is the common turpentine. This is received into stone and earthen pots, and is ready for sale. The thicker matter, which remains in the basket, they put into a common alembic, adding a large quantity of water. They distil this as long as any oil is seen swimming upon the water. This oil they separate from the surface in large quantities, and this is the common oil or spirit of turpentine. The remaining matter at the bottom of the still is common yellow resin. When they have thus obtained all that they can from the sap of the tree they cut it down, and, hewing the wood into billets, they fill a pit dug in the earth with these billets, and, setting them on fire, there runs from them while they are burning a black thick matter. This naturally falls to the bottom of the pit, and this is the tar. The top of the pit is covered with tiles, to keep in the heat; and there is at the bottom a little hole, out at which the tar runs like oil. If this hole be made too large it sets the whole quantity of the tar on fire; but, if small enough, it runs quietly out. The tar, being thus made, is put in barrels; and if it is to be made into pitch they put it into large boiling vessels, without adding any thing to it. It is then suffered to boil a while, and, being then let out, is found when cold to be what we call pitch. A decoction of the nuts or seeds of this species in milk, or of the extremities of the branches pulled in spring, is said, with a proper regimen, to cure the most inveterate scurvy. The wood of this species is not valued.

10. P. rubra, the Scotch fir or pine. It is common throughout Scotland, whence its name; though it is also found in most of the other countries of Europe. M. Du Hamel, of the Royal Academy of Sciences, mentions his having received some seeds of it from St. Domingo, and thence concludes that it grows indifferently in the temperate, frigid, and torrid zones. The wood is the red or yellow deal, which is the most durable of any of the kinds yet known. The leaves are much shorter and broader than those of the pinea, of a grayish color, growing two out of one sheath; the cones are small, pyramidal, and end in narrow points; they are of a light color, and the seeds are small. The wood of the Scotch pine is superior to that of any other species. When planted in bogs, or in a moist soil, though the plants make great progress, yet the wood is white, soft, and little esteemed; but when planted in a dry soil, though the growth of the trees is there very slow, yet the wood is proportionably better. Few trees have been applied to more uses than this. The tallest and straightest are formed by nature for masts to our navy. The timber is resinous, durable, and applicable to numberless domestic purposes, such as flooring and wainscoting of rooms, making of beds, chests, tables, boxes, &c. From the trunk and branches of this, as well as most others of the pine tribe, tar and pitch are obtained. By incision, barras, Burgundy pitch, and turpentine, are acquired and prepared. The resinous roots are dug out of the ground in many parts of the Highlands, and, being divided into small splinters, are used by the inhabitants to burn instead of candles. At Loch-Broom, in Ross-shire, the fishermen make ropes of the inner bark; but hard necessity has taught the inhabitants of Sweden, Lapland, and Kamtschatka, to convert the same into bread. To effect this they, in the spring season, make choice of the tallest and fairest trees; then, stripping off carefully the outer bark, they collect the soft, white, succulent interior bark, and dry it in the shade. When they have occasion to use it, they first toast it at the fire, then grind, and after steeping the flour in warm water, to take off the resinous taste, they

make it into thin cakes, which are baked for use. On this strange food the poor inhabitants are sometimes constrained to live for a whole year; and we are told, through custom, become at last even fond of it. Linnæus remarks that this same bark bread will fatten swine; and humanity obliges us to wish that men might never be reduced to the necessity of robbing them of such a food. The interior bark of which the above-mentioned bread is made the Swedish boys frequently peel off the trees in the spring, and eat raw with greedy appetite. From the cones of this tree are prepared a diuretic oil, like the oil of turpentine, and a resinous extract, which has similar virtues with the balsam of Peru. An infusion or tea of the buds is highly commended as an antiscorbutic. The farina, or yellow powder, of the male flowers is sometimes in the spring carried away by the winds in such quantities, where the trees abound, as to alarm the ignorant with the notion of its raining brimstone. The tree lives to a great age; Linnæus affirms to 400 years.

11. P. strobus, Lord Weymouth's pine, or North American white pine. This grows sometimes to the height of 100 feet and upwards, and is highly valued on account of its beauty. The bark of the tree is very smooth and delicate, especially when young; the leaves are long and slender, five growing out of one sheath; the branches are pretty closely garnished with them, and make a fine appearance. The cones are long, slender, and very loose, opening with the first warmth of the spring; so that if they are not gathered in winter the scales open and let out the seeds. The wood of this sort is esteemed for making masts for ships. In queen Anne's time there was a law made for the preservation of these trees, and for the encouragement of their growth in America. Within these last fifty years they have been propagated in Britain in considerable plenty. The best soil for this species is a sandy loam, but inferior soils will answer.

12. P. tæda, the swamp pine, is a tall evergreen tree, a native of the swamps of Virginia and Canada. There are several varieties of this genus, which Hanbury enumerates and describes, such as, 1st, The three-leaved American swamp pine. 2d, The two leaved American pine. 3d, The yellow American pine, the yellow tough pine, and the tough pine of the plains; among which there is but little variety. 4th, The bastard pine. 5th, The frankincense pine. And, 6th, The dwarf pine.

PINZGAU, a large district of the duchy of Salzburg, Upper Austria. It extends across the duchy, from Carinthia to the Tyrol, and has an area of nearly 900 square miles, with 26,000 inhabitants. It consists of mountains of great height, which occupy almost the whole face of the country, except the Salza valley. That river rises among these mountains. Cattle here form the general object of attention; but in the mountains are mines of copper and lead.

PIOMBINO, a principality of Tuscany, between the provinces of Pisa and Sienna, extending along the sea-coast. Its superficial extent is 190 square miles; its population 18,000, and its annual revenue about £8000. The soil is fertile in corn, wine, oil, and fruits. It has likewise good pastures.

PIOMBINO, a town of Italy, the capital of the principality of this name, is situated on a rocky promontory on the Mediterranean, opposite the island of Elba. It is the residence of the prince, and contains a population of 4000, a harbour, and considerable fisheries. Forty miles south by east of Leghorn, and sixty S.S.W. of Florence.

PION, a descendent of Hercules, who built Pionia. Paus. ix. c. 18.

PIONEER', *n. s.* *Pionier*, from *pion*, obsolete French. According to Scaliger, *pion* comes from *peo* for *pedito*, a foot soldier, who was formerly employed in digging for the army. A pioneer is in Dutch *spagenier*, from *spage* a spade; whence Junius imagines that the French borrowed *pagenier* and pioneer. One whose business it is to level the road, throw up works, or sink mines in military operations.

Well said, old mole, can'st work i' the' ground so fast!
A worthy *pioneer*. *Shakspeare. Hamlet*

Three try new experiments, such as themselves think good; these we call *pioneers* or miners. *Bacon.*

His *pioneers*
Even the paths, and make the highways plain. *Fairfax.*

Of labouring *pioneers*
A multitude, with spades and axes armed,
To lay hills plain, fell woods, or vallies fill. *Milton.*

The Romans, after the death of Tiberius, sent thither an army of *pioneers* to demolish the buildings and deface the beauties of the island. *Addison.*

PIONEERS, in the art of war, are such as are commanded in from the country, to march with an army for the above purposes. The soldiers are likewise employed in all these services. Most of the foreign regiments of artillery have half a company of pioneers, well instructed in that important branch of duty. Our regiments of infantry and cavalry have three or four pioneers each, provided with aprons, hatchets, saws, spades, pick-axes, &c.

PIONIA, a town of Mysia, in Caycus.

PI'ONY, *n. s.* Lat. *pæonia.* A large flower. See PEONY.

There might you see the *piony* spread wide,
The full blown rose, the shepherd and his lass,
Lapdog and lambkin with black staring eyes,
And parrots with twin cherries in their beak. *Cowper*

PIONY. See PÆONIA.

PIOZZI (Mrs. Hester Lynch), was the daughter of John Salisbury, esq. of Bodvel, Caernarvonshire, born in 1739. Early in life she was distinguished by her accomplishments, and in 1763 accepted the hand of Mr. Thrale, an opulent brewer of Southwark, which he then represented in parliament. Soon after her acquaintance with Dr. Johnson commenced, of whom she, at a subsequent period, published Anecdotes, in one octavo volume. Mr. Thrale dying in 1781, she retired to Bath, and in 1784 accepted the addresses of signor Piozzi, a Florentine, who taught music in that city. A warm expostulation from her friend Dr. Johnson upon the subject

entirely dissolved their friendship; and soon after her marriage she accompanied her husband on a visit to Italy, during her residence in which she joined Messrs. Merry, Greathead, and Parsons, in the production of a collection of pieces in verse and prose, entitled the Florence Miscellany. Of this a few copies were printed in 1786, but it was never published. Her other writings are Three Warnings, a tale, in imitation of La Fontaine. A Translation of Boileau's Epistle to his Gardener, first printed in Mrs. Williams's Miscellany, and a prologue to the Royal Suppliants; Observations made in a Journey through France, Italy, and Germany, 2 vols. 8vo. 1789; British Synonymy, or an Attempt at Regulating the Choice of Words in Familiar Conversation, 2 vols. 8vo. 1794; and Retrospection of a Review of the most striking Events, &c., and their consequences, which the last 1800 Years have presented to the View of Mankind, 2 vols. 4to. 1801. Mrs. Piozzi became a second time a widow, and died at Clifton, May 2d, 1821, in her eighty-second year.

PIP, *n. s.* & *v. a.* Fr. *pepie*; Dan. *pip*; Belg. *pippe*, deduced by Skinner from *pituita*; but probably coming from *pipio* or *pipilo*, on account of the complaining cry. A disease of fowls; a horny pellicle that grows on the tip of their tongues; a spot on cards: to chirp or cry like a bird.

When murrain reigns in hogs or sheep,
And chickens languish of the *pip*. *Hudibras.*

It is no unfrequent thing to hear the chick *pip* and cry in the egg, before the shell be broken. *Boyle.*

A spiteful vexatious gypsy died of the *pip*. *L'Estrange.*

When our women fill their imaginations with *pips* and counters, I cannot wonder at a new-born child that was marked with the five of clubs. *Addison's Guardian.*

Pip, or Pep, a disease among poultry, consisting of a white thin skin, or film, that grows under the tip of the tongue, and hinders their feeding. It usually arises from want of water, or from drinking puddle-water, or eating filthy meat. It is cured by pulling off the film with the fingers, and rubbing the tongue with salt. Hawks are particularly liable to this disease, especially from feeding on stinking flesh.

PIPE, *n. s.*, Pi'per, Pi'ping, *adj.* } Saxon pipe; Welsh *pib*; Belg. *pype*; Teut. *pfeif*; Fr. *pipe*; Ital. and Span. *pipa*; Heb. בב. A tube; any long hollow body; a musical instrument; the key or organs of voice: to pipe is to play on the pipe: hence a feeble sound: a piper is one who plays on that instrument: piping, feeble or weak of sound; sickly; applied also to the bubbling noise of boiling, as in the phrase 'piping hot.'

We have *piped* unto you, and you have not danced. *Matthew.*

Pipers and trumpeters shall be heard no more in thee. *Revelation.*

The veins unfilled, our blood is cold, and then
We powt upon the morning, are unapt
To give or to forgive; but when we've stuffed
These *pipes*, and these conveyances of blood
With wine and feeding, we have suppler souls. *Shakspeare.*

I have known, when there was no musick with him but the drum and the fife, and now had he rather hear the tabor and the *pipe*. *Id.*

My throat of war be turned,
Which quired with my drum, into a *pipe*
Small as an eunuch's. *Id. Coriolanus.*

His big manly voice,
Turning again toward childish treble, *pipes*
And whistles in his sound. *Id. As You Like It.*

I, in this weak *piping* time of peace,
Have no delight to pass away the time,
Unless to spy my shadow in the sun. *Shakspeare.*

Merry Michael, the Cornish poet, *piped* thus upon his oaten *pipe* for merry England. *Camden.*

Try the taking of fumes by *pipes*, as in tobacco and other things, to dry and comfort. *Bacon.*

That office of her majesty's exchequer, we, by a metaphor, call the *pipe*, because the whole receipt is finally conveyed into it by the means of divers small *pipes* or quills, as water into a cistern. *Bacon.*

The exercise of singing openeth the breast and *pipes*. *Peacham.*

The part of the *pipe*, which was lowermost, will become higher; so that water ascends by descending. *Wilkins.*

The solemn *pipe* and dulcimer. *Milton.*

Then the shrill sound of a small rural *pipe*
Was entertainment for the infant stage. *Roscommon.*

In singing, as in *piping*, you excel. *Dryden.*

There is no reason why the sound of a *pipe* should leave traces in their brains. *Locke.*

It has many springs breaking out of the sides of the hills, and vast quantities of wood to make *pipes* of. *Addison.*

An animal, the nearer it is to its original, the more *pipes* it hath, and as it advanceth in age still fewer. *Arbuthnot.*

Gaming goats and fleecy flocks,
And lowing herds, and *piping* swains,
Come dancing to me. *Swift.*

My husband's a sot,
With his *pipe* and his pot. *Id.*

The *pipe*, with solemn interposing puff,
Makes half a sentence at a time enough,
The dozing sages drop the drowsy strain,
Then pause and puff, and speak, and pause again. *Cowper.*

Pipe, *n. s.* Fr. *pipe*; Belg. *peep*. A liquid measure containing two hogsheads.

I think I shall drink in *pipe* wine with Falstaff; I'll make him dance. *Shakspeare. Merry Wives of Windsor.*

Pipe. See Weights and Measures.

Pipe, Pipa, in law, is a roll in the exchequer, called also the great roll.

Pipe, in mining, is where the ore runs forward endwise in a hole, and does not sink downwards or in a vein.

Pipe, Air. See Air-Pipes.

Pipe Fish. See Syngnathus.

Pipe Office is an office wherein the officer called the clerk of the pipe makes out leases of crown lands, by warrant from the lord treasurer, or commissioners of the treasury, or chancellor of the exchequer. To this office are brought all accounts which pass the remembrancer's office, and remain there. All tallies which vouch the payment of any sum contained in such accounts are examined and allowed by the chief secondary of the pipe. Besides the chief clerk, in this

office, there are eight attorneys or sworn clerks, and a comptroller.

Pipes, in practical mechanics, are of various sorts, as tobacco-pipes, once much in use by persons of all conditions, but now very generally laid aside by persons in the middle class of life, and almost wholly by those who move in higher circles. Still the demand for them is considerable, and there are many manufactures of them in the vicinity of London: those employed in it, however, seem rarely to rise to a state of competence. There are pipes likewise which answer the purpose of canals or conduits for the conveyance of water and other liquids. These are made of wood, of lead, of iron, of copper, of pottery ware, and of stone. We shall give a sketch of the manufacture of each of these.

Tobacco-pipes are too well known to need a minute description: they consist of a long tube from twelve to fifteen or eighteen inches in length, made of a peculiar kind of clay, having at one end a little bowl for the reception of tobacco, the smoke of which when lighted is drawn by the mouth through the other end. They are made of various shapes and fashions: some long, others short; some are very plain, and can be sold to the publicans at the rate of four or five a penny; others are handsomely wrought, and varnished of different colors, and are sold as high as from eight to twelve shillings per gross. The Turks, who are famed for smoking, make use of pipes three or four feet long made of rushes or of wood, bored at the end, on which they fix a kind of pot of baked earth, which serves as a bowl, and which they take off after smoking. To make the tube tight some are made of spiral wire covered with leather. This at the same time leaves them flexible, and the bowl can stand on the ground whilst the smoker inhales its fumes through an ivory or silver mouth-piece. Of this kind is the hookah, or houkar, of Hindostan: it is a complete furnace or chafing-dish, with grate-bars, ash-pit, &c., having a tight cover over the top with one of these flexible pipes attached to it. An officer of the court of a petty eastern prince is called houkar boudar, and is solely employed in managing this machine, the mouth-piece of which he presents with due solemnity to his master after dinner. In some instances the bowl is kept in an adjacent closet, and the pipe conducted through a hole in the wall. Those which are most complete have another peculiarity; the smoke, before it goes into the tube, is made to pass under water, by bubbling up through it, which, by depriving it of its acrid and pungent taste, is found to give it a mild and agreeable flavor.

The clay of which our tobacco-pipes are made is perfectly white, and is distinguished from other kinds by its great adhesion to the tongue, which is well known to be considerable when baked, in consequence of its affinity to water. In a raw state this property is perceptible in a slight degree. The pipe-clay is largely found at the island of Purbeck in Dorsetshire, and at Teignmouth in Devonshire, in lumps, which are purified by dissolving in water; the solution being well stirred up, in a large pit, is poured off into another, where it subsides and deposits the clay; the water becoming clear is let off, and the clay at the bottom is left sufficiently dry for use: by this means the smallest stones or particles of foreign matter are left at the bottom of the first pit. The clay thus prepared is spread on a board and beaten with an iron bar to temper and mix it; then it is divided into pieces of the proper size to form a tobacco-pipe; each of these pieces is rolled under the hand into a long roll with a bulb at one end to form the bowl, and in this state they are laid up in parcels for a day or two until they become sufficiently dry for pressing, which is the next process, and is conducted in the following manner:—

The roll of clay has a small wire thrust nearly through its whole length to form the tube, and is put in between two iron moulds, each of which has imprinted in it the figure of one-half of a pipe, and therefore when put together the cavity between them is the figure of a whole one. They are put together by pins, which enter holes in the opposite half. The moulds with the clay in them are now put into a press, which consists of an iron frame formed of two plates, one of which is fixed down to the bench, and the other pressed towards it by a screw turned round by a handle. The moulds are put in between the two plates, and the screw being turned round presses them together, imprinting the figure of a pipe on the clay included between them. The lever is next depressed, and the stopper entering the mould forms the bowl of the pipe, and the wire which is still in the pipe is thrust backwards and forwards to carry the tube completely into the bowl. The press is now opened by turning back the screw, and the mould is taken out. A knife is next thrust into a cleft of the mould left for the purpose, to cut the end of the bowl smooth and flat: the wire is carefully withdrawn, and the pipe taken out of the mould. The pipes, when so far completed, are laid by two or three days properly arranged for the air to have access to them in all their parts, till they become stiff, when they are dressed with scrapers to take off the impression of the joints of the moulds; they are afterwards smoothed and polished with a piece of hard wood.

The next process is baking or burning, and this is performed in a furnace of peculiar construction. It is built within a cylinder of brick-work, having a dome at top, and a chimney rising from it to a considerable height. Within this is a lining of fire brick-work having a fire-place at the bottom of it. The pot which contains the pipes is formed of broken pieces of pipes and cemented together by fresh clay, hardened by burning: it has a number of vertical flues surrounding it, conducting the flame from the fire-grate up to the dome, and through a hole in the dome into the chimney. Within the pot several projecting rings are made, and upon these the bowls of the pipes are supported, the ends resting upon circular pieces of pottery which stand on small loose pillars rising up in the centre. By this arrangement a small pot or crucible can be made to contain fifty gross of pipes without the risk of damaging any of them. The pipes are put into the pot at one side when the crucible is open, but when filled this orifice is made up with

broken pipes and fresh clay. At first the fire is but gentle; by degrees it is increased to the proper temperature, and so continued for seven or eight hours, when it is damped and suffered to cool gradually: the pipes, when cold, are taken out and ready for sale.

Wooden pipes are trees bored with large iron augers of different sizes, beginning with the less and proceeding on to those that are larger; the first being pointed, the rest are formed like spoons, increasing in diameter from one to six or eight inches; they are fitted into the extremities of each other. If small, these pipes are frequently bored by mere manual labor, but where they are large, and made of hard wood, the use of horses or of the steam engine is required. On the large scale the following will serve as a description of their manufacture:—The piece of timber, or perhaps the tree itself, when a little shaped on the outside by the axe, intended to form a pipe, is placed on a frame and held down firmly upon it by means of iron chains and windlasses; it is at the same time wedged up to prevent its rolling sideways; if the piece is tolerably straight this will answer every purpose, otherwise it must be fixed firm by wedges, iron hooks, &c., similar to those used by sawyers, driven into the carriage at one end and into the tree at the other. The frame and tree being bound together run upon small wheels traversing two long beams, or, as they are usually called, ground-sills, placed on each side of a pit dug to receive the chips made by the borers. At one end they are connected by a cross beam bolted upon them: this supports the bearing for a shaft, the extremity of which beyond the bearing is perforated at the end of a square hole, to receive the end of the borer. The timber and carriage are made to advance towards the borer by means of ropes: one rope being made to wind up, while the other gives out and draws the carriage and piece of timber backwards and forwards according as the wheel is turned. The weight of the borer is supported by a wheel turning between uprights fixed on a block, the end of which rests upon the ground-sills. It is moved forwards by two iron bars pinned to the front cross-bar of the carriage. The distance between the wheel and the carriage may be varied, by altering the iron bar and pins so as to bring the wheel always as near as convenient to the end of the tree. The shaft, as we have already hinted, may be turned by any first mover, as wind, water, horses, or steam, as is most convenient, and a man or boy regulates the wheel. When the borer is put in motion, by turning the wheel, the workman draws the tree up to the borer that pierces it; when a few inches are bored he draws the tree back by reversing the motion of the wheel, in order that the borer may throw out its chips; he then returns the tree, and continues the process till the work is finished. The borer in this case, be its size what it will, is of the same shape as that of a common auger.

Some years ago Mr. Howel, of Oswestry, invented an engine for the purpose of boring or hollowing wooden water-pipes, by means of which the process is not only much more expeditious, but causes a considerable saving of timber. By this mode, instead of the common method of boring by augers, or instruments of any other description which perforate the wood by cutting out the inner part of the substance in chips or shavings, a hollow tube or cylinder, made of thin plates of iron or other metal, about one inch less in diameter than the hole to be bored, is to be made use of. To one end of this tube or cylinder is to be fixed a flanch or ring, of from one-quarter of an inch to five eighths of an inch in breadth; and one part of the circumference of this flanch or ring is to be divided or separated, so that, if it be made of steel, an edge or cutter may be formed thereby; or, for the more convenient use of it, a cutter of steel or other metal may be screwed, or otherwise connected with the tube and the flanch or ring. The recommendation of this instrument is, that it will bore out a piece of wood capable of being converted into a pipe or pipes of smaller dimensions, with the aid of less power, and with less waste of wood than by means of the process usually resorted to. But it may be proper to add that very few wooden pipes are now employed.

By another invention, pipes have been made of separate pieces or staves, instead of boring the solid timber. In this case, the end of one piece of pipe is tapered off to fit into the next piece, and the different parts are connected by dove-tailing, rabbetting, screws, &c. &c. The outer and inner surfaces may be painted, varnished, or covered over with pitch, tar, or any kind of cement that can be made to adhere.

The method of making *leaden pipes* consists in casting the lead upon a smooth steel mandril, placed in a mould also of metal, to form the outside. These pieces are about eighteen inches long. They are afterwards joined together by a process called lining. But a very great improvement has been recently made in the manufacture of leaden pipes, by drawing them in a manner similar to wire. The lead to form the pipe is cast upon a mandril of the diameter of the inside of the pipe, but of such a thickness as to equal the whole pipe in weight; it is then fastened upon one end of a cylindric steel mandril, and the lead is pulled through different sized holes till the pipe is of sufficient length and thickness. These pipes can be drawn to the length of eight or ten feet. The power required, however, is very great, which is one objection to the method. They are also liable to flaws; for, if the casting happen to be imperfect, the imperfection is much increased and extended by the process of drawing.

This manufacture has been much improved by passing the lead upon the mandril through grooved rollers of different sizes, following each other in succession. The power required is much less than that required for drawing; and the pipes are said to be superior in other respects. See PLUMBING.

Iron pipes are cast at the foundries of any dimensions; and, for durability and strength combined, are greatly superior to any other material: they may be procured in lengths of ten feet, and united by nuts and screws passed through flaunches, cast on the ends of them. Most of the water companies of the metropolis have, within

these few years past, adopted cast-iron pipes for their mains; they are usually cast in lengths of ten feet, with an enlarged socket at one end of sufficient size to receive the end of the next pipe. As these joints cannot be driven close, to fit like wooden joints, they require some cement. To apply this, the joint is first caulked, by driving a small quantity of hemp down to the bottom of it with a blunt chisel, and then filling the remainder of the socket with iron cement, which is a composition of borings or turnings of cast-iron, mixed up with sulphur and sal ammoniac. This is moistened with water, and rammed into the cavity; the rapid oxidation of the iron borings unites them into one mass, and at the same time expands the bulk of the cement, so as to fill up all the space. Another method, much used for large pipes, is to have two ears projecting from each pipe at the joint, through which screw-bolts are passed, to draw them close. The joints are sometimes filled with lead run in whilst melted.

Of late years pipes made of pottery have also been brought much into use; and Bell, of Birmingham, obtained in 1808 his majesty's letters patent for the exclusive privilege of manufacturing the following kind :—

'It has been found,' says he, 'by long experience, that pumps or pipes for conducting water from water-works which have been made of wood, or iron, lead, or any other metallic substances, have been objected to; the nature of my improvement is, therefore, to remove the aforesaid objections, which I completely perform by making tubes of porcelain pottery, and various compositions which are vitrifiable, and not liable to corrosion or decay. These tubes are formed in such a way at the ends as to fit one within the other, which I connect or unite together by cement, so as to make them water or air tight. And by the addition of any number of these tubes, connected as aforesaid, I form one complete tube or pipe to any extent which may be required. I prefer the method of enclosing them in cast-iron pipes or cases, which are to be made in various ways and forms; which pipes or cases serve as defenders of these porcelain or pottery tubes, to prevent breaking or bursting. Cases or pipes may be made of wood, and various other substances, for enclosing these porcelain or pottery tubes or pipes; but, for the sake of compactness, strength, and durability, I recommend cast-iron cases, boxes, or pipes. There are compound metals which are less corrosive than the real metals as aforesaid, of which tubes may be made, and if enclosed in the manner before described would be useful in conducting water and various liquids, either hot or cold, for particular purposes; as also thin tubes, made of wood, which may be prepared for durability by boiling it, or burning or charring it, which has the effect of preventing its breeding or harbouring insects, &c.' Of these last, in addition to his porcelain or pottery tubes enclosed, he claims the invention.

The Manchester Water-Works Company employ *stone pipes* for the conveyance of their water, and the stone which they have found most suitable to their purpose comes from a quarry at Fox-Hill, in the parish of Gorting-Power, Gloucestershire, which is very like the Portland-stone; but the latter is the more dense or specifically heavy, in the proportion of seventeen to sixteen; that is, the Fox-hill stone requires seventeen cubical feet to the ton, but sixteen feet only of the Portland-stone go to the ton. The following method is used in boring the stone for pipes :—the first mover is a steam-engine of a power adapted to the work, giving a rotatory motion to a shaft placed horizontally, and running from one end of the works to the other. The works are divided into compartments, each of which serves for the boring of four pipes at the same time; by means of what is known to mechanics by the name of the bevel-geer, motion is communicated from the main horizontal shaft to a vertical arbor, at the top of which is a wheel. The rotatory motion of this wheel, by means of a crank bar, gives a reciprocating motion to the larger wheel, and this latter motion is such as to give rather more than a complete rotation to each of four smaller wheels placed opposite; with respect to the larger wheel, the mutual connexion between them and it being by means of teeth or cogs. Thus the small wheels go through somewhat more than a complete rotation in one direction, and then rather more than a complete rotation in the opposite direction, and so on alternately. On the vertical shafts, beneath the smaller wheels, are placed iron tubes, which are suffered to act by their own weights upon the stones to be bored, and by means of their rotation to bore those stones by attrition. The stones are cut into lengths of six or eight feet, and bored into pipes of various diameters. When the pipes are of fourteen inches diameter the thickness of stone allowed is about five inches. The tubes by which the boring is effected are of course fourteen inches in diameter, and weigh about one hundred and a half. They are made of thin plate iron, except their circular rim or sole at the bottom, which is about half an inch thick. As the attrition wears away the stones on which the soles of the tubes rest, they sink lower and lower; a semi-fluid mixture of sand and water runs down from the small wheels at the top of the tubes, keeping the whole moist, and carrying off the particles of stone as it is bored.

Copper-pipes are made of copper plate turned up and soldered, and are much used in distillers' work, because they can be tinned withinside, and then communicate no taint: but they are too expensive for ordinary use.

Pipes of an Organ. See Organ.

Pipes, Sea, in zoology, are univalved shells, of an oblong figure, terminating in a point, sometimes a little bending, and sometimes straight. Sea ears, figures of which we have given along with sea-pipes, are also univalved flat shells, resembling in shape the ear of a man. In sea ears it is not uncommon to find small pearls, the seeds of which are often found in the middle of their cavities, which are of the finest naker or mother-of-pearl color. There are ridges on both sides; those without form a kind of volute or spire, terminating in an eye. In these shells there is a row of round holes, six of which generally go quite through. There is a shell of

this kind, which is longer in proportion to its width, and much less common, for it is never found in our seas. There is another, very fine and thin, of a dirty gray color, neither nakered nor perforated as the others are; the inner rim is spiral, and at some distance from the outer. The sea pipes are distinguished from sea worms by having their pipes single; whereas the others form an assemblage of pipes joined together. The sea worms, from the number and junction of their parts, are multivalves. The shells of pipes called dentales and antales, are distinguished from each other only by their size, the antales being much the least. The sea-pencil, or watering spout, is the most remarkable shell of this tribe, and must be considered as having a specific character, either by its form, which is straight, or the singularity of its superior extremity, which is perforated like the spout of a watering pot. The shell, pierced with many holes, is found with its natural covering in our seas. It is finely nakered within, and in the middle of its hollow or cavity contains many small pearls.

Piper (Francis Le), an eminent English painter, the son of a gentleman in Kent, descended from a Walloon family. His father gave him a liberal education, but his genius led him to painting, in which he had a peculiar talent; for he needed but to see a face once, and would paint as exact a likeness as if the person had sat often. He also painted landscapes well; but delighted in painting faces peculiarly striking or ugly. He likewise modelled figures in wax to the life. In his travels he was equally whimsical. He often set out on a tour through France, the Netherlands, Germany, and even Egypt, without taking leave of his friends, or warning them of his return. He died in Aldermanbury in 1740, in consequence of his surgeon pricking an artery when bleeding him.

Piper, in ichthyology. See Trigla.

Piper, in botany, pepper; a genus of the trygynia order, and diandria class of plants; natural order second, piperitæ. There are twenty species; the most remarkable are:—1. P. amalago, or black pepper, and the piper inequale, with some other species, are indigenous, and named joint wood, or peppery elders. The first bears a small spike, on which are attached a number of small seeds of the size of mustard. The whole plant has the exact taste of the East India black pepper.

2. P. betelum, the betel, or betle, is a creeping and climbing plant like the ivy; and its leaves a good deal resemble those of the citron, though they are longer and narrower at the extremity. It grows in all parts of India, but thrives best in moist places. The natives cultivate it like the vine, placing props for it to climb upon; and it is a common practice to plant it against the tree which bears the areca nut. At all times of the day, and even in the night, the Indians chew the leaves of the betel, the bitterness of which is corrected by the areca that is wrapped up in them. There is constantly mixed with it the chinam, a kind of burnt lime made of shells. The rich frequently add perfumes, either to gratify their vanity, or their sensuality; as it is a powerful incentive to love. Betel is taken after meals; it is chewed during a visit; it is offered when you meet, and when you separate; in short, nothing is to be done without betel. If it is prejudicial to the teeth, it assists and strengthens the stomach. At least, it is a general fashion that prevails throughout India.

3. P. inequale, the long pepper of Jamaica. The bush grows taller than the amalago. The leaves are broad, smooth, and shining. The fruit is similar to the long pepper of the shops but smaller. The common people in Jamaica season their messes with the black pepper. To preserve both, the fruit may be slightly scalded when green, then dried, and wrapped in paper.

4. P. siriboa, with oval, heart-shaped, nerved leaves, and reflexed spikes. This is the plant which produces the pepper used in food. It is a shrub whose root is small, fibrous, and flexible; it rises into a stem, which requires a tree or a prop to support it. Its wood has the same sort of knots as the vine; and, when it is dry, it exactly resembles the vine branch. The leaves, which have a strong smell and a pungent taste, are of an oval shape; but they diminish towards the extremity, and terminate in a point. From the flower buds, which are white, and are sometimes placed in the middle and sometimes at the extremity of the branches, are produced small berries resembling those of the currant tree. Each of these contains between twenty and thirty corns of pepper; they are commonly gathered in October, and exposed to the sun seven or eight days. The fruit, which was green at first and afterwards red, when stripped of its covering, assumes the appearance it has when we see it. The largest, heaviest, and least shrivelled, is the best. The pepper plant flourishes in the islands of Java, Sumatra, and Ceylon, and more particularly on the Malabar coast. It is not sown but planted: and great nicety is required in the choice of the shoots. It produces no fruit till the end of three years; but bears so plentifully the three succeeding years, that some plants yield between six and seven pounds of pepper. The bark then begins to shrink; and the shrub declines so fast that in twelve years it ceases bearing. The culture of pepper is not difficult: it is sufficient to plant it in a rich soil, and carefully to pull up the weeds that grow in great abundance round its roots, especially the first three years. As the sun is highly necessary to the growth of the pepper plant, when it is ready to bear, the trees that support it must be lopped to prevent their shade from injuring the fruit. When the season is over, it is proper to crop the head of the plant. Without this precaution, there would be too much wood, and little fruit. See a full account of the method of cultivating pepper in Sumatra, in Marsden's History of Sumatra, or New Annual Register, 1783. The pepper exported from Malabar, which was formerly entirely in the hands of the Portuguese, and is at present divided between the Dutch, British, and French, amounts to about 10,000,000 weight.

PIPERINE is a name given to a new vegetable principle extracted from black pepper by M. Pelletier. To obtain it, black pepper was digested repeatedly in alcohol, and the solution

evaporated, until a fatty resinous matter was left. This, on being washed in warm water, became of a good green color. It had a hot and burning taste; dissolved readily in alcohol, less so in ether. Concentrated sulphuric acid gave it a fine scarlet color. The alcoholic solution after some days deposited crystals; which were purified by repeated crystallisation in alcohol and ether. They then formed colorless four-sided prisms, with single inclined terminations. They have scarcely any taste. Boiling water dissolves a small portion; but not cold water. They are soluble in acetic acid: from which combination feather-formed crystals are obtained. This substance fuses at 212° Fahrenheit. The fatty matter left after extracting the piperine is solid at a temperature near 32°, but liquifies at a slight heat. It has an extremely bitter and acrid taste, is very slightly volatile, tending rather to decompose than to rise in vapor. It may be considered as composed of two oils: one volatile and balsamic; the other more fixed, and containing the acrimony of the pepper.

Pipe Tree. The lilac tree.

Pipe Tree, in botany. See Syringa.

PIP'KIN, *n. s.* Diminutive of pipe, a vessel. A small earthen boiler.

> Some officer might give consent
> To a large covered *pipkin* in his tent. *King.*
> A *pipkin* there like Homer's tripod walks. *Pope.*

PIPLEY, or Pipali, a town of Hindostan, in the province of Orissa, district of Mohurbunge, situated on the Subuenreeka River, twenty-two miles north-east from Balasore. About the middle of the seventeenth century this was a great resort of European trade, whence the Dutch shipped annually 2000 tons of salt: and the first permission obtained by the English from the Mogul emperors to trade with Bengal was restricted to this place, now almost unknown. Since that period the floods have washed away great part of the town.

PIPLY, a town in the province of Orissa, district of Cuttak, thirty miles south from the town of Cuttak.

PIP'PIN, *n. s.* Dutch *puppynghe*.—Skinner. A sharp apple.

> You shall see mine orchard, where, in an arbour, we will eat a last year's *pippin* of my own graffing. *Shakspeare.*

> *Pippins* take their name from the small spots or pips that usually appear on the sides of them: some are called stone *pippins* from their obdurateness; some Kentish *pippins*, because they agree well with that soil; others French *pippins*, having their original from France, which is the best bearer of any of these *pippins*; the Holland *pippin* and the russet *pippin*, from its russet hue; but such as are distinguished by the names of grey and white *pippins* are of equal goodness; they are generally a very pleasant fruit and of good juice, but slender bearers. *Mortimer's Husbandry.*

> Entertain yourself with a *pippin* roasted. *Harvey.*

> The *pippin*-women I look upon as fabulous. *Addison.*

> His foaming tusks let some large *pippin* grace,
> Or 'midst those thundering spears an orange place. *King.*

> This *pippin* shall another trial make:
> See from the core two kernels brown I take. *Gay.*

> On twigs of hawthorn he regaled,
> On *pippins'* russet peel,
> And when his juicy sallads failed,
> Sliced carrot pleased him well. *Cowper.*

Pippin, or Pippen. See Pyrus.

PIPRA, in ornithology, a genus of birds of the order of passeres. Latham gives it the name of manakin, and so does Buffon, who informs us that it was bestowed upon them by the Dutch settlers in Surinam. Latham describes twenty-five different species, and five varieties. The general character is, that the bill is short, strong, hard, and slightly incurvated, and the nostrils are naked. The middle toe is connected to the outer as far as the third joint: this character, however, is not universal, some species differing in this particular. The tail is short. This genus has a considerable resemblance to the genus parus, or titmouse. They are supposed to inhabit South America only, but Mr. Latham has seen many of those species which he has described, that came from other parts, which certainly belong to this genus.—Buffon differs widely in his arrangement from him, and only enumerates six species. He gives the following account of the genus in general:—'The natural habits common to them all were not known, and the observations which have been made are still insufficient to admit an exact detail. We shall only relate the remarks communicated to us by Sonnini of Manoncour, who saw many of these birds in their native climates. They inhabit the immense forests in the warm parts of America, and never emerge from their recesses to visit the cleared grounds of the vicinity of the plantations. They fly with considerable swiftness, but always at a small height, and to short distances; they never perch on the summits of trees, but on the middle branches; they feed upon small wild fruits, and also eat insects. They generally occur in small bodies of eight or ten of the same species, and sometimes intermingle with other flocks of the same genus, or even of a different genus, such as the Cayenne warblers, &c. It is commonly in the morning that they are found thus assembled, and then seem to be joyous, and warble their delicate little notes. The freshness of the air seems to inspire the song; for they are silent during the burning heat of the day, and disperse and retire to the shade of the thickest part of the forest. This habit is observed, indeed, in many kinds of birds, and even in those of the woods of France, where they collect to sing in the morning and evening; but the manakins never assemble in the evening, and continue together only from sun-rise to nine or ten o'clock A. M. and remain separate during the rest of the day and the succeeding night. In general they prefer a cool humid situation, though they never frequent marshes or the margins of lakes.'

1. P. musicalis, or, as Mr. Latham calls it, the tuneful manakin. Its length is four inches, the bill is dusky, the forehead yellow, and the crown and nape blue: the chin, sides of the head below the eyes, and the throat, are black; the upper part of the back, the wings, and the tail, are dusky black; the tail is very short; the lower part of the back and rump, the breast, belly, vent, and thighs, are orange-colored; the legs are

dusky. It is a native of St. Domingo, where it has gained the name of organiste from its note, forming the completest octave in the most agreeable manner, one note successively after another. It is said not to be uncommon, but not easy to be shot, as, like the creeper, it perpetually shifts to the opposite part of the branch from the spectator's eye, so as to elude his vigilance. It is most likely the very bird mentioned by Du Pratz, above quoted, whose notes, he says, are so varied and sweet, and which warbles so tenderly, that those who have heard it value much less the song of the nightingale. It is said to sing for nearly two hours without scarce taking breath, and, after a respite of about the same time, begins again. Du Pratz, who himself has heard it, says that it sung perched on an oak, near the house he was then in.

2. P. rupricola, the crested manakin, is about the size of a small pigeon, being about ten or twelve inches long. The bill is about an inch and a quarter long, and of a yellowish color. The head is furnished with a double round crest; the general color of the plumage is orange, inclining to saffron; the wing-coverts are loose and fringed; the quills are partly white and partly brown; the tail feathers are twelve; the base half of the ten middle ones is of an orange color, thence to the ends they are brown; the outer feathers are brown, and the base half of the inner web is orange; all are similarly fringed; the upper tail coverts are very long, loosely webbed, and square at the ends; the legs and claws are yellow. The female is altogether brown, except the under wing-coverts, which are of a rufous orange; the crest is neither so complete nor rounded as that of the male. Both males and females are at first gray, or of a very pale yellow, inclining to brown. The male does not acquire the orange color till the second year, neither does the female the full brown. 'This beautiful species,' says Latham, 'inhabits various parts of Surinam, Cayenne, and Guiana, in rocky situations; but is nowhere so frequent as in the mountain Luca, near the river Oyapoc, and in the mountain Courouaye, near the river Aprouack, where they build in the cavernous hollows, and the darkest recesses. They lay two round white eggs, the size of those of a pigeon, and make the nest of a few dry bits of sticks. They are in general very shy, but have been frequently tamed, insomuch as to run at large among the poultry. It is said that the female, after she has laid eggs for some years, and ceases so to do more, becomes at the ensuing moult of the same color as the male, and may be mistaken for him; in this imitating the females of various kinds of poultry, such as the peacock, pheasant, &c. See Pavo, &c. A most complete pair is in the Leverian Museum.' Our author describes a variety of this species, which he calls the Peruvian manakin. It is longer than the preceding, especially in the tail, and the upper coverts of it are not truncated at the ends; the wing coverts are not fringed as in the rock manakin, and the crest is not so well defined as in that bird; the general color of the plumage inclines much to red; the second coverts and rump are of an ash color; the wings and tail are black; the bill, and legs are as in the last described. It is an inhabitant of Peru, whence its name.

PIQUA, or Piquatown, a post town of Miami county, Ohio, on the Great Miami, 130 miles from its mouth; eight miles north of Troy, thirty south of Wapaghkanetta, sixty-seven W. N. W. of Columbus, 125 south of Fort Meigs. It is delightfully situated, and is a flourishing town.

PI'QUANT, *adj.* Fr. *piquant.* Piercing; stimulating to the taste.

Some think their wits asleep, except they dart out somewhat that is *piquant*, and to the quick; that is a vein that would be bridled; and men ought to find the difference between saltness and bitterness *Bacon's Essays.*

A small mistake may leave upon the mind a lasting memory of having been *piquantly*, though wittily, taunted. *Locke.*

Men make their railleries as *piquant* as they can to wound the deeper. *Government of the Tongue.*

There are vast mountains of a transparent rock, extremely solid, and as *piquant* to the tongue as salt. *Addison on Italy.*

PIQUE, *n. s.* & *v. a.* Fr. *pique, piquer.* Ill will; offence taken; petty malevolence: to touch with, or provoke to ill will; also, with the reciprocal pronoun, to value; to fix reputation as on a point. Fr. *se piquer.*

He had never any the least *pique*, difference, or jealousy with the king his father. *Bacon's Henry VII.*

Men take up *piques* and displeasures at others, and then every opinion of the disliked person must partake of his fate. *Decay of Piety.*

Though he have the *pique* and long,
'Tis still for something in the wrong;
As women long, when they're with child,
For things extravagant and wild. *Hudibras.*

Add long prescription of established laws,
And *pique* of honour to maintain a cause,
And shame of change. *Dryden.*

Men apply themselves to two or three foreign, dead, and which are called the learned, languages; and *pique* themselves upon their skill in them. *Locke.*

Out of a personal *pique* to those in service, he stands as a looker-on, when the government is attacked. *Addison.*

Piqued by Protogenes' fame,
From Cos to Rhodes Apelles came,
To see a rival and a friend,
Prepared to censure or commend. *Prior.*

Why *pique* all mortals, that affect a name!
A fool to pleasure, yet a slave to fame! *Pope.*

The lady was *piqued* by her indifference, and began to mention going away. *Female Quixote.*

Pique, Fr. in music, or Piquiren, a German expression for staccato; but these terms apply more generally to violin passages, because they denote a greater degree of staccato execution than the piano forte is capable of producing.

PIQUEER'ER, *n. s.* Rather pickeerer. Ital. *piccare.* A robber; plunderer.

When the guardian professed to engage in faction, the word was given, that the guardian would soon be seconded by some other *picqueerers* from the same camp. *Swift.*

PIQUET', *n. s.* Fr. *picquet.* A game at cards. See Picquet.

She commonly went up at ten,
Unless *piquet* was in the way. *Prior.*

Instead of entertaining themselves at ombre or *piquet*, they would wrestle and pitch the bar. *Spectator.*

PIRA ACANGATA, the name of a Brasilian fish which resembles the perch in size and shape, seldom exceeding four or five inches in length; its mouth is small; its tail forked. On the back it has only one long fin, supported by rigid and prickly spines. This fin it can depress at pleasure, and sink within a cavity in the back. Its scales are of a silvery white color; it is wholesome and well tasted.

PIRA COABA, the name of an American fish of the trutaceous kind, of a very delicate flavor. It grows to twelve inches; its nose is pointed, and its mouth large, but without teeth; the upper jaw is longer than the under one, and hangs over like a cartilaginous prominence; its eyes are very large, and its tail is forked; under each of the gill fins there is a beard of six white filaments, covered with silvery scales. *Marcgrave.*

PIRA PIXANGA, another Brasilian fish of the turdus or wrasse kind, called by some the gatvisch. It is generally about four or five inches long; its mouth is pretty large, and furnished with very small, and very sharp teeth; its head is small, but its eyes are large and prominent, the pupil being of a fine turquoise color, and the iris yellow and red in a variety of shades. The coverings of the gills end in a triangular figure, and are terminated by a short spine or prickle; its scales are very small, and so evenly arranged, and closely laid on the flesh, that it is very smooth to the touch; its tail is rounded at the end; its whole body, head, tail, and fins, are of a pale yellow color, variegated all over with very beautiful blood-colored spots: these are round, and of the size of hemp seed on the back and sides, and something larger on the belly; the fins are all spotted in the same manner, and are all marked with an edge of red. It is caught among the rocks, and about the shores, and is a very well tasted fish.

PI'RACY, *n. s.*
PI'RATE, *n. s.* & *v. n.*
PIRAT'ICAL, *adj.*
Fr. *pirate;* Lat. *pirata;* Greek πειρατης. Robbery at sea; a sea-robber: to take by robbery: predatory; consisting with robbery: all these terms have been metaphorically applied by booksellers and authors, to the fraudulent invasion of COPYRIGHT, which see.

Pirates all nations are to prosecute, not so much in the right of their own fears, as upon the band of human society. *Bacon.*

Having gotten together ships and barks, fell to a kind of *piratical* trade, robbing, spoiling, and taking prisoners the ships of all nations. *Id.*

Our gallants, in their fresh gale of fortune, began to scum the sea with their *piracies.* *Carew.*

Now shall the ocean, as thy Thames, be free
From both those fates of storms and *piracy.* *Waller.*

His pretence for making war upon his neighbours was their *piracies;* though he practised the same trade. *Arbuthnot.*

When they were a little got out of their former condition, they robbed at land and *pirated* by sea. *Id.*

Relate, if business or the thirst of gain
Engage your journey o'er the pathless main,
Where savage *pirates* seek through seas unknown
The lives of others, vent'rous of their own. *Pope.*

The errors of the press were multiplied by *piratical* printers; to not one of whom I ever gave any other encouragement than that of not prosecuting them. *Id.*

PIRACY, by the ancient common law, if committed by a subject, was held to be a species of treason, being contrary to his natural allegiance; and, by an alien, to be felony only: but now, since the statute of treasons, 25 Edw. III. c. 2, it is held to be only felony in a subject. Formerly it was only cognisable by the admiralty courts, which proceed by the rules of the civil law. But, it being inconsistent with the liberties of the nation that any man's life should be taken away, unless by the judgment of his peers, or the common law of the land, the statute 28 Hen. VIII. c. 15 established a new jurisdiction for this purpose, which proceeds according to the course of the common law. This offence, by common law, consists in committing those acts of robbery and depredation upon the high seas, which, if committed upon land, would have amounted to felony there. But, by statute, some other offences are made piracy also: as, by statute 11 and 12 W. III. c. 7, if any natural born subject commits any act of hostility upon the high seas, against others of his majesty's subjects, under color of a commission from any foreign power; this, though it would only be an act of war in an alien, shall be construed piracy in a subject. And farther, any commander, or other seafaring person, betraying his trust, and running away with any ship, boat, ordnance, ammunition, or goods; or yielding them up voluntarily to a pirate; or conspiring to do these acts; or any person assaulting the commander of a vessel, to hinder him from fighting in defence of his ship; or confining him, or causing or endeavouring to cause a revolt on board; shall, for each of these offences, be adjudged a pirate, felon, and robber, and shall suffer death, whether he be principal, or merely accessory by setting forth such pirates, or abetting them before the fact, or receiving or concealing them or their goods after it. By the stat. 8 Geo. I. c. 24, the trading with known pirates, or furnishing them with ammunition, or fitting out any vessel for that purpose, or in anywise consulting, combining, confederating, or corresponding with them; or the forcibly boarding any merchant vessel, though without seizing or carrying her off, and destroying or throwing any of the goods overboard; shall be deemed piracy; and such accessories to piracy as are described by the statute of king William are declared to be principal pirates; and all pirates convicted by virtue of this act are made felons without benefit of clergy. By the same statutes also (to encourage the defence of merchant vessels against pirates), the commanders or seamen wounded, and the widows of such seamen as are slain, in any piratical engagement, shall be entitled to a bounty, to be divided among them, not exceeding one-fiftieth part of the value of the cargo on board: and such wounded seamen shall be entitled to the pension of Greenwich hospital;

which no other seamen are, except only such as have served in a ship of war. And if the commander shall behave cowardly, by not defending the ship, if she carries guns or arms; or shall discharge the mariners from fighting, so that the ship falls into the hands of pirates; such commander shall forfeit all his wages, and suffer six months imprisonment. Lastly, by statute 18 Geo. II. c. 30, any natural born subject or denizen, who in time of war shall commit hostilities at sea against any of his fellow subjects, or shall assist an enemy on that element, is liable to be tried and convicted as a pirate.

PIRÆEUS, or PIRÆUS, portus, in ancient geography, a celebrated port on the west of Athens, consisting naturally of three harbours or basins, was originally a village of Attica, on an island; and, though distant forty stadia from Athens, was joined to it by two long walls, and itself walled round; with a very commodious and safe harbour. The whole of its compass was sixty stadia, including the Munychia. Near the Piræus stood the sepulchre of Themistocles; whither his friends conveyed his bones from Magnesia. The entrance of the Piræus is narrow, and formed by two rocky points, one belonging to the promontory of Ætion, the other to that of Alcimus. Within were three stations for shipping; Kantharus, so called from a hero of that name; Aphrodisium, from a temple of Venus; and Zea, the resort of vessels laden with grain. Here was a demos or borough town of the same name before the time of Themistocles, who recommended the exchanging its triple harbour for the single one of Phalerum, both as more capacious and as better situated for navigators. The wall was begun by him when archon, in the second year of the seventy-fifth Olympiad, A. A. C. 477; and afterwards he urged the Athenians to complete it as the importance of the place deserved. This whole fortification was of hewn stone, without cement or other material, except lead and iron, which were used to hold together the exterior ranges or facings. It was so wide that the loaded carts could pass on it in different directions, and it was forty cubits high, which was, however, only half what he had designed. Hippodamus, a celebrated architect, was employed to lay out the ground. Five porticoes, which uniting formed the long portico, were erected by the ports. Here was an agora or market-place, and, farther from the sea, another called Hippodamia. Near the vessels were dwellings for mariners. A theatre was opened, temples were raised, and the Piræus, which surpassed the city in utility, began to equal it in dignity. The cavities and windings of Munychia, natural and artificial, were filled with houses; and the whole settlement, comprehending Phalerum and the ports of the Piræus, with the arsenals, the storehouses, the famous armory of which Philo was the architect, and the sheds for 300, and afterwards 400, triremes, resembled the city of Rhodes, which had been planned by the same Hippodamus. The ports, on the commencement of the Peloponnesian war, were secured with chains. Sentinels were stationed, and the Piræus was carefully guarded. It was reduced with great difficulty by Sylla, who demolished the walls, and set fire to the armory and arsenals. In the civil war it was in a defenceless condition. Calenus, lieutenant to Cæsar, seized it, invested Athens, and ravaged the territory. Strabo, who lived under the emperors Augustus and Tiberius, observes that the many wars had destroyed the long walls, with the fortress of Munychia, and had contracted the Piræus into a small settlement by the ports and the temple of Jupiter. In the second century, besides houses for triremes, the temple of Jupiter and Minerva remained, with their images in brass, and a temple of Venus, a portico, and the tomb of Themistocles. The port of the Piræus has been named Porto Lione, from its marble lion, and also Porto Draco. The lion was a piece of admirable sculpture, ten feet high, and reposing on its hinder parts. It was pierced, and, as some think, belonged to a fountain. Near Athens, in the way to Eleusis, was another, couchant; probably its companion. Both these were removed to Venice by general Morosini, and placed in front of the arsenal.

PIRANESI, an eminent Venetian architect and engraver, born about 1711. He was remarkable for a bold and free manner of etching, whereby he drew his figures upon the plate at once. He died in 1780.

PIRATE is used for an armed ship that roams the seas without any legal commission, and seizes or plunders every vessel she meets indiscriminately, whether friends or enemies.

PIRENE, a fountain sacred to the Muses, springing below the top of the Acrocorinthus, a high and steep mountain which hangs over Corinthus. Its waters were agreeable to drink, extremely clear, very light and pale, representing the grief of Pirene, and the paleness brought on by the too eager pursuits of the Muses. Plin. Paus. Strab. Athen. Pers.

PIRENE, in mythology, a daughter of the river god Achelous, who had two sons by Neptune, named Leches and Cenchrius, from whom the two harbours of Corinth were named. The latter was killed by Diana, and Pirene was so disconsolate for his death that she wept continually till she was dissolved into the fountain that bears her name.

PIRISTENA, or PRISTENA, a town of Turkey in Europe, near Cossora, in the west of Romania, 118 miles east of Ragusa. It is a bishop's see, and contains 9000 or 10,000 inhabitants, but is little known or visited by travellers.

PIRITHOUS, in fabulous history, a king of the Lapithæ, in Thessaly, son of Ixion and the cloud; or, as others say, of Jupiter and Dia. Hearing of the exploits of Theseus, he resolved to try his valor by invading Attica; but, when the two monarchs met at the head of their armies, they formed a lasting friendship, which afterwards became proverbial. Pirithous soon after married Hippodamia, the daughter of Adrastus, king of Argos, when as well as the Centaurs the gods themselves were invited, but Mars, the god of war, being excepted, avenged the neglect by occasioning dissension among the guests. The centaur Eurythion, attempting to offer violence to the bride, was killed by Theseus; on which a general battle ensued between the Centaurs and Lapithæ, wherein the former were defeated. See

LAPITHÆ. After this, Hippodamia dying, Pirithous became disconsolate; till, consulting with Theseus, they formed the desperate enterprize of descending to hell, and carrying off the goddess Proserpine; for which Pluto condemned Pirithous to be tied to Ixion's wheel, or worried by the dog Cerberus. But he was soon after deilvered by Hercules, and restored to his kingdom

PIRMASENZ, a town in the Bavarian province of the Rhine, chiefly noted for its respectable public buildings, and having been in the course of the last century the capital of Hesse Darmstadt. At this period it had nearly 9000 inhabitants; but they have since diminished to little more than one-third of that number. It has an elegant council-house, a Lutheran school and church, and a Calvinist church. On the 14th September 1793 the duke of Brunswick obtained an advantage over the French near this town. Thirteen miles E. S. E. of Deux Ponts, and thirty-five west of Spire.

PIROMALLI (Paul), a learned dominican of Calabria, who was sent a missionary into the east. He remained long in Armenia, where he brought back to the Romish faith many schismatics and Eutychians, and finally the patriarch himself, who had before thrown every obstacle in his way. He afterwards went into Georgia and Persia, and into Poland, as Pope Urban VIII.'s nuncio, to appease the disturbances occasioned by the Armenians, whom he reunited to the church. In the course of his return to Italy he was taken by some Corsairs who carried him prisoner to Tunis. As soon as he was ransomed, he went to Rome, and gave an account of his mission to the pope, who conferred upon him signal marks of his esteem; entrusted him with the revisal of an Armenian Bible, and sent him again into the east where he was promoted, in 1655, to the bishopric of Nassivan. After having governed that church for nine years, he returned to Italy, and took the charge of the church of Basignano, where he died in 1667. His charity, and other virtues, did honor to his character and office. There are extant, of his writings, some Controversial and Theological works; an Armenian and a Persian Dictionary; an Armenian Grammar; and a Directory of great use in correcting Armenian books.

PIRON (Alexis) the son of an apothecary, was born at Dijon in 1689, and spent thirty years in dissipation. He was obliged to quit Dijon, on account of an ode he had written, which gave great offence. He supported himself at Paris by the elegance of his hand-writing, and lived in the house of M. de Bellisle, as his secretary, and afterwards with a financier. His reputation as a writer commenced with some pieces which he published, which showed strong marks of original invention; but what fully established his character in this way was his comedy entitled Metromony, which was the best that had appeared in France since Regnard's Gamester. This performance, in five acts, well conducted, replete with genius, wit, and humor, was acted with the greatest success upon the French stage in 1738; and the author met with every attention in the capital which was due to a man of genius. He died the 21st of January 1773, aged eighty-three. A collection of his works appeared in 1776 in 7 vols. 8vo. and 9 vols. 12mo. The principal pieces are, Gustavus and Ferdinand Cortez, two tragedies, and The Courses of Tempe, an ingenious pastoral.

PISA, in ancient geography, a town of Elis, on the Alphæus, at the west end of the Peloponnesus, founded by Pisus. Oenomaus reigned in it, till he was conquered by Pelops. See PELOPS. Its inhabitants accompanied Nestor to the Trojan war, and long enjoyed the privilege of presiding at the Olympic games, which were celebrated near Pisa. But this honorable distinction proved at last their destruction. For they were envied for it by the people of Elis, who made war upon them, and after many bloody battles, with various success, at last took their city and totally demolished it. Pisa was famous for its horses; its inhabitants were called Pisæi and Pisates; and a colony of them founded Pisæ, now Pisa, in Italy.

PISA, a city in the north-west of Italy, and grand duchy of Tuscany, situated on the Arno. It is six miles in circuit and stands on an extensive and richly cultivated plain, bounded by the Appennines on one side, and open on the other to the Mediterranean. The noble river divides the town into two nearly equal parts; the quays, which run along either bank from one extremity to the other, are spacious, and bordered by rows of good houses; the bridges are three in number, and the middle one is built of marble. The streets have raised flags for foot passengers, and are in general broad and well-paved. The cathedral, with its baptistery, cemetery, and belfry, is perhaps the finest specimen that exists of the gothico-moresco style of building. The exterior is covered with marble, diversified with columns and other remains of antiquity, and surmounted by a handsome dome. The interior is adorned with numerous statues and paintings. The baptistery is of beautiful marble, embellished in the interior with columns and arcades. The Campo Santo, a large oblong building, with elegant gothic windows, encloses a court formerly used as a cemetery, in which is a variety of monuments, sarcophagi, and other Greek and Roman antiquities. But, of all the buildings of Pisa, the most curious is a cylindrical tower of 188 feet in height, constructed of successive rows of pillars, chiefly marble, and remarkable for its inclination of about fifteen feet from the perpendicular. This is ascribed by some writers to design, by others to the sinking of a part of the soil on which the edifice stands; it does not, however, appear in the least to affect the solidity of the building, which has stood for more than six centuries. The city contains several other elegant churches: the square of the university likewise contains several marble buildings; among other public establishments the hospital for 300 patients is worthy of notice. The university is one of the oldest in Italy. Though reduced by the subjugation of Pisa to the Florentines, it was afterwards reinstated, and is still accounted the seat of superior Tuscan education. It has four colleges, with forty professors; a library, botanical garden, cabinet of natural history, and an observatory.

Pisa was one of the twelve towns of ancient Etruria, afterwards augmented by a colony from Rome. In the tenth century it took the lead of the commercial republics of Italy, and in the eleventh its fleet maintained a superiority in the Mediterranean, and assisted in the crusades. But in the thirteenth century the ascendancy of Genoa cast Pisa into the shade, and since the beginning of the sixteenth it has been subject to Florence. Its population must at this period evidently have been far beyond its present limit. Its trade has long been very circumscribed, Leghorn absorbing the foreign intercourse: it contains, however, a few manufactures, and the mildness of the climate during winter attracts hither a number of invalids. The baths in the neighbourhood, called the Bagni di Pisa, are also much resorted to. Water is brought to the town by a very long aqueduct. The fortifications consist of a wall and ditch, a castle and a modern citadel. It is the see of an archbishop, and has given birth to Galileo, Algarotti, and various eminent persons. Population 17,000. It stands about eight miles from the mouth of the river, thirteen north by east of Leghorn, and thirty west of Florence.

PISÆ, in ancient geography, a town of Etruria, built by a colony of Pisæi, from Pisa in Peloponnesus. Dionysius of Halicarnassus says it was built before the Trojan war, but others say it was built by those Pisæans who were shipwrecked on the coast of Italy in their return from it. The people were called Pisani, and were once very powerful. They conquered Sardinia, Corsica, and the Baleares Islands. It is now called Pisa.

PISAN (Thomas), a celebrated astrologer of Bologna, who was invited to Venice by Forli, counsellor of that republic, who gave him his daughter in marriage. Charles V. of France invited him to his court, whither he went in 1380, and predicted the day of his death, which, it is said, happened accordingly.

PISAN (Christina), daughter of the astrologer, was born in Venice in 1363, and was an accomplished writer. She wrote the Life of King Charles V. of France, and was much patronised by Charles VI.

PISAURUM, in ancient geography, a town of Italy, in Picenum. It became a Roman colony, in the consulship of Claudius Pulcher. It is now called Pesaro. It was destroyed by an earthquake, in the beginning of Augustus's reign.

PISCATAQUA, a river of New Hampshire, which rises in Wakefield, separates New Hampshire from Maine, and, pursuing a S.S.E. course of about forty miles, flows into the Atlantic, below Portsmouth. From its source to Berwick lower falls it is called Salmon fall river; thence to the junction of the Chocheco it takes the name of Newichawannock, and afterwards that of Piscataqua. By means of the Piscataqua and its tributary waters a sloop navigation is opened to South Berwick, Dover, Newmarket, Durham, and Exeter. Piscataqua harbour, formed by the mouth, is one of the finest on the continent.

PISCATAQUIS, a river of Maine, which runs east into the Penobscot, twenty-five miles below the junction of the Metawamkeak. Length 100 miles.

PISCATAQUOG, a river of New Hampshire, which rises in Deerfield and Francestown, and runs E. S. E. into the Merrimack, in north-east corner of Bedford.

PISCATION, *n. s.* } Lat. *piscatio, piscatorius, piscis* and *voro.*
PIS'CATORY, *adj.* } The act or art of fishing:
PISCIV'OROUS. } relating to fishes: living on fish.

There are four books of cynegeticks, or venation, five of halieuticks, or *piscation*, commented by Ritterhusius. *Browne.*

In birds that are not carnivorous, the meat is swallowed into the crop or into a kind of ante-stomach, observed in *piscivorous* birds, where it is moistened and mollified by some proper juice. *Ray.*

On this monument is represented, in bas-relief, Neptune among the satyrs, to show that this poet was the inventor of *piscatory* eclogues. *Addison.*

PISCES, Lat. piscis, a fish, is the fourth class of the animal kingdom in the system of Linnæus: the science which treats of the habits and peculiarities of these interesting animals is frequently denominated ichthyology. The great Swedish naturalist includes in this class all those animals who constantly inhabit the water, breathe by means of gills, swim by means of fins, and are mostly covered with cartilaginous scales. The heart has the same structure, and the blood the same qualities, with those of the *amphibia;* but the animals belonging to this class are easily distinguished from the amphibia by having no such voluntary command of their lungs, and by having external branchiæ or gills.

Fishes are ranked by Cuvier amongst the vertebral animals, who breathe by means of branchiæ or gills, have no trachea or larynx, and whose organs of motion consist of fins. They have a nose unconnected with the organs of respiration; ear entirely enclosed in the head; the tympanum, &c., being absent. Both jaws are moveable. The place of the pancreas is supplied by the pyloric cæca. They have moreover a urinary bladder, two ovaries, and a heart consisting of a single auricle and ventricle. They may be distributed into two leading divisions; the cartilaginous, whose skeleton consists of cartilage; the bony, where it is formed of a more firm substance. To these we shall again advert.

Popularly fishes may be considered in respect to their general structure, as distinguished into the *Compressed,* when the diameter from side to side is less than from back to belly: *Depressed,* when the diameter from side to side is greater than from back to belly: *Oblong,* when the longitudinal exceeds the transverse diameter; *Oval,* when the base is likewise circular; *Orbicular,* when the longitudinal and transverse diameters are nearly equal; *Gibbous,* when the back presents one or more protuberances; carinate, ensiform, cuneiform, wedgeshaped, &c. The surface of the body is termed naked when destitute of scales; scaly when furnished with them; smooth when the scales are without angles, &c.; lubricous when provided with a mucus; tuberculate, &c.; loricate, or mailed, when enclosed in a hard integument; fasciate or banded when marked with zones from the

back to the belly; spinous, striped, reticulate, or checquered, &c.

The parts of the body of fishes are external or internal. The former are

I. The Head.—The head is placed at the anterior part of the body, and is obtuse, acute, slanting, aculeate, unarmed, &c. To this member belong the mouth, nose, jaws, lips, teeth, tongue, palate, eyes, and the branchial opercules, membrane and aperture. 1. The mouth is called superior when placed at the upper part of the head: inferior when at the lower part; vertical when it descends perpendicularly, horizontal when it is parallel to the water in which the fish swims; oblique when it is neither vertical nor horizontal. 2. The nose or snout is cuspidate when its apex terminates in a sharp point; spatula-shaped when its extremity is flattened; triquetrous or tetraquetrous, having three or four flat sides; reflex when it is incurved towards the belly. 3. The jaws, always two in number, vary in respect to figure, &c., being subulate or awl-shaped; carinate or keel-shaped; dentate, or provided with teeth; naked, not covered with lips, &c. 4. The lips are often not distinctly visible, and are either of a fleshy or a bony consistence; distinguished into plicate, or consisting of folds, and retractile, or capable of being drawn in or out. 5. The teeth are either acute, obtuse, serrate, similar, dissimilar, &c. 6. The tongue is acute or obtuse; bifid, or divided into two lobes; carinate, or ridged on the surface; dentate, or covered with teeth; papillous, or covered with fleshy points. 7. The palate is smooth (destitute of teeth or tubercles) or it is denticulate. 8. The nostrils are situated generally before the eyes, and are situated anterior when they occupy the fore part of the rostrum, or snout; posterior when they occupy the base; superior when they are on the crown of the head; cylindrical when they form a tube; solitary when there is only one on each side the head; double when there are two. 9. The eyes, which are two in number, consist of the pupil and the iris; besides which most of them have a firm pellucid membrane, called the nictitant membrane, which serves the purpose of an eyelid. The eyes are covered, semi-covered, or naked, according as they are furnished or otherwise with this membrane; vertical, or lateral, when situated on the crown or the sides of the head; binate when both are on the same side of the head; plane, or depressed, when the convexity of the ball does not rise above the surface of the head; convex when they exceed the surface; saliant when they are very prominent. 10. The branchial opercles, or gill-covers, are scaly or bony processes situated on both sides of the head, and close the gills; they are simple when composed of a single piece; diphyllous, triphyllous, &c., when composed of two, three, or more pieces; ciliate, having the margin fringed; scabrous when covered with asperities; striate, or marked with hollow lines; radiate when the marks run like rays, &c. 11. The branchial, or branchiostegous membrane, formed of crooked bony substances, is under and adheres to the opercula, being capable of being folded or expanded at pleasure; it is either patent, i. e. projecting beyond the margin of the opercula and latent; or covered, according as it is more or less concealed by them. 12. The aperture of the gills is commonly lateral and cleft, formed by means of the gills and closed by the opercula. It is aculeate, or arched; operculate when covered by the opercles; pipe-shaped, in the form of a tube.

II. The Trunk.—This comprehends in fishes all the body, from the nape to the fins, and consists of the branchiæ or gills, throat, thorax, back, sides, abdomen, lateral line, anus, tail, and scales. 1. The gills are generally formed of four unequal bones, furnished with small soft appendages, like the beards of a feather, of a red color. They are aculeate when provided with spines; denuded when wanting opercles, &c. 2. The throat is situated between the branchial apertures, and is said to be swelling when it exceeds the level of the body; carinate when angulated underneath; plane when in a line with the thorax and head. 3. The thorax is comprehended between the throat and pectoral fin. 4. The back, or upper part of the body, extends from the nape to the origin of the tail. It is apterygious if without fins; monopterygious, dipterygious, &c., if furnished with one or two, &c., fins; convex, serrate, &c. 5. The sides are between the back and the abdomen. 6. The abdomen is the under part of the trunk, between the extremity of the thorax and the tail; it is either carinate, serrate, or plane. 7. The lateral line is a line formed by tubercles or lines along the sides, and terminating at the fins; it is straight, curved, broken, interrupted, double, &c. 8. The anus, or vent, is the external orifice of the rectum, said to be jugular when situated under the branchial opercles; pectoral when under the gills; remote when distant from the head; mean equally near the head and the tail. 9. The tail is the solid part of the trunk, and either round, carinate, muricate, or apterygious, &c. 10. The scales are cartilaginous integuments, oval; orbiculate, i. e. nearly round; smooth; ciliate, i. e. set with setaceous processes; serrate, i. e. toothed like a saw; or imbricate, when the scales partly lap over one another.

III. The Fins. The fins are bony rays, connected by a tender membrane, and denominated, according to their position, dorsal, pectoral, ventral, anal, or caudal. 1. The dorsal fins are situated on the upper part of the trunk, between the head and tail, and vary in number; whence called monopterygious, dipterygious, &c.; they are said to be fleshy when covered with a thick skin or muscular substance; and ramentaceous when furnished with filamentous appendages, &c. 2. The pectoral fins are on each side, about the aperture of the gills, and are solitary, double, or altogether wanting. 3. The ventral fins are in the under part of the fish, and are abdominal, jugular, thoracic, &c., according to their situation. 4. The anal fin is between the anus and the caudal fin, and is bifurcate, or two forked; coalescing, i. e. united with the caudal fin; longitudinal, extending from the anus to the tail; posterior when placed at the end of the tail near the caudal fin. 5. The caudal fin

is at the extremity of the tail, and is equal or entire when its rays are of equal length; lanceolate when the middle rays are the largest; emarginate when they are the shortest, &c.

The internal parts of fishes are,

I. Organs and Viscera.—The principal organs and viscera that have been distinguished in fishes are the brain, œsophagus or gullet, stomach, swimming or air-bladder, heart, intestines, liver, gall-bladder, spleen, urinary-bladder, kidneys, diaphragm, peritonæum, and ova. Fishes have no external organ of hearing, and were long supposed to have none internal; but modern naturalists conceive that they have found traces of this organ in a membrane at some distance behind the eyes of several fishes, as the skate, cod-fish, &c. Those who deny the sense of hearing to fishes suppose they perceive sounds through their feeling, being affected by the vibratory motion sounds produce in the water. 1. The brain is divided into three lobes, surrounded by a kind of matter resembling saliva. In this region are the optic and olfactory nerves. 2. The œsophagus or gullet is short, and scarcely to be distinguished from the stomach, which is a membranous sack divided into two lobes. 3. The swimming or air-bladder, called also the sound, is an oblong white membranous bag, in which is contained a quantity of elastic air. This organ lies close to the back bone, and has a strong muscular coat, by which it can contract itself. Flat fish are unprovided with this bladder. 4. The heart is of a triangular form, with the apex upwards, and consists of one auricle and one ventricle. It is enclosed in a pericardium. 5. The intestines are in general short, making only three turns, the last of which terminates in a common outlet or vent. 6. The liver is remarkably large, commonly on the left side, and contains a great proportion of oil or fat. 7. The gall-bladder is oval, and is under the right side of the liver. It communicates with the stomach by means of the cystic duct and choledochic canal. 8. The spleen varies in form and color, and is situated near the backbone, so as to be subject to the alternate constriction and dilatation of the air-bladder. 9. The urinary bladder is in most fishes of an oval form, terminating under the tail. 10. The kidneys are two flat pyramidal bodies, of a reddish color, and the length of the abdomen. 11. The diaphragm is a white, shining membrane, which separates the thorax from the abdomen. 12. The peritonæum is a thin dark membrane, that invests the contents of the abdomen. 13. The ova, or roe, in the females, and the milt, or soft roe in the males, are disposed into two large oblong bodies, one on each side the abdomen.

II. Bones.—The bones of the skeleton of a fish may be divided into those of the head, thorax, abdomen, and fins. 1. The head contains a vast number, in the perch as many as eighty; those of the skull are the principal; besides which are those of the palate, the jaw bones, the opercular bones, &c. 2. The thorax is a cavity formed by the sternum, or back-bone, the vertebræ, clavicles, and scapulæ. 3. The abdomen is encompassed by the ribs and ossa pelvis, defending the viscera. 4. The tail is composed of bones which terminate the vertebral column; the fins consist of an intertexture of ossicles and firm membranes.

III. Muscles.—The muscles in fish consist of the two lateral muscles proceeding from the head to the tail, along the side, which have transverse branches that are similar and parallel: those of the caudal and pectoral fins which have four muscles each, namely, two erectors and two depressors; each ventral fin has also three muscles, one erector and two depressors. 2. The carinal muscles of the back and tail are slender, closely united, and proportioned in number to the dorsal fins. Those fishes with one dorsal fin having one pair of carinal muscles; those with two dorsal fins three pair, &c. 3. The interspinous muscles are those which raise and depress the dorsal and anal fins, of which there are four to each interspinous ray; namely, two erectors and two depressors.

IV. Vessels.—The principal vessels are, 1. The aorta, attached to the apex of the heart, which sends out numerous branches to the gills, and is afterwards subdivided into very minute vessels. 2. The sinus venosus, which communicates with the auricle by a large aperture, and receives at the other end three principal trunks of veins. 3. The lacteals and lymphatics, which, together with the thoracic duct, &c., form a network about the heart, and in various parts of the trunk.

We have adopted throughout this work the arrangement of Linnæus in most departments of natural history: and have described the different species of animals under their respective genera. It can only remain in this place to give a brief sketch of the history of ichthyology as a science (if indeed it has any history prior to the time of Linnæus), and to add his and Cuvier's principal orders.

The authors who have left treatises on this subject are numerous; and are ranged by Artedi into their proper classes, with great care. The following is an abstract of his account, with some additions:—

The systematical ichthyologists are Aristotle, Pliny, Isidore, Albertus Magnus, Gaza, the interpreter of Aristotle, Marschall, Wootton, Bellonius, Rondeletius, Salvian, Gesner, Aldrovand, Johnston, Charlton, Willughby, Ray, Artedi, and Linnæus.

Those who have written of the fishes of particular places are, Ovid, of the fishes of the Euxine; Oppian, of those of the Adriatic; Ausonius, of those of the Moselle; Mangolt, of those of the Podamic lake; Paulus Jovius, of those of the Tyrrhene Sea; Bened. Jovius, of those of the lake Larius; Petrus Gillius, of those of the Massilian Sea; Figulus, of those of the Moselle; Salvian, of those of the Tyrrhene Sea; Schwenkfeldt, of those of Silesia: Schonefeldt, of those of Hamburgh; Margrave of the Brasilian fishes; Ruysel, of those of Amboyna; and Francis Valentine, of those of the same place. Of these authors, Ovid, Ausonius, Oppian, and Bened. Jovius, wrote in verse, the rest in prose.

Those who are to be regarded only as com-

pilers from the works of other writers. Pliny, Ælian, Athæneus, Isidore, the author of the Libri De Natura Rerum, Albertus Magnus, Johannes Cuba, Marschall, Gesner in great part, Aldrovand in great part, Johnston, Charlton, &c.

In regard to method, some have treated of fishes in alphabetical order; some have followed a natural method more or less perfect; others have attended to no method at all, as Ovid, Ælian, Athæneus, Ausonius, Hildegarde, De Pinguia, Paulus, and Bened. Jovius, Figulus, Salvian in his History of the Roman Fishes, and Ruysch: those who have written alphabetically, are Cuba, Marschall, Salvian in his Tabula Piscatoria, Gesner, Schonefeldt, Johnston.

Among the authors who have adopted some kind of method, may first be placed those who have treated of fishes according to the place where they are caught; as Oppian, Rondeletius, Aldrovand, Johnston, and Charlton. Those who have treated of fishes, dividing them into cetaceous, spinose, and cartilaginous, are Aristotle, the author of this method, Wootton, Willughby, Ray; the last two authors have added to this plan the numbering the rays of the fins on the back.

This was the first step towards the arrangement of Linnæus or Artedi; for the latter in fact was the original author of the system commonly known as that of the illustrious Swede. Willughby's work, entitled De Historia Piscium, was printed at Oxford in 1686, and unfolded many new and accurate views of the anatomy and physiology of fishes. Ray published, in 1707, his Synopsis Methodica Piscium, which may be regarded as an abridged and corrected view of Willughby's larger work, and as indicating a series of genera. This valuable descriptive catalogue continued to be appealed to as a standard, till Artedi and Linnæus effected numerous important changes.

The former of these died before he could mature his plan, and Linnæus, his friend and coadjutor, first published it in 2 vols. 8vo. under the titles of Bibliotheca Ichthyologia, and Philosophia Ichthyologica: republished in 1792 in four vols. But Artedi instituted the orders and genera, and defined the characters on which these divisions are founded. Independently of the cetaceous tribes, which are now classed with the mammalia, his method consisted of four great divisions, viz. 1. The malacopterygian, which denoted those fishes which have soft fins, or fins with bony rays, but without spines: this order included twenty-one genera. 2. The acanthopterygian, or those with spiny fins, containing sixteen genera. 3. The branchiostegous, which corresponds to the amphibia nantes of Linnæus, which want the operculum, or branchiostegous membrane: and 4. The chondropterygian, which answers to that part of the amphibia nantes which have not true bones, but only cartilages, and the rays of whose fins scarcely differ from a membrane. In the first edition of the System of Nature Linnæus wholly adopted this method, but more matured reflection led him to make considerable alterations.

It may be worth mentioning, in conclusion of this sketch, that Klein and Gronovius have also been projectors of new ichthyological systems, which have rivalled the Linnæan. Klein distributed fishes into three sections, according as they had lungs, and visible or invisible gills; but his subdivisions were very numerous and complex, and his scheme never extensively adopted. That of Gronovius was founded on the presence or absence, and the number or the nature of the fins: his first class including all the cetaceous animals, and the second all the fishes properly so called. The chondropterygian, and the osseous or bony, form two other great divisions, and the osseous are sub-divided into bronchiostegous and branchial. These last are grouped according to the Linnæan rules, but, in the formation of the genera, the number of the dorsal fins is admitted as a character. Scopoli also struck out an original path, and assumed the position of the anus as the basis of his three primary divisions; his secondary characters sometimes coincided with those of Gronovius, and sometimes with those of Linnæus; while his third series of characters was drawn from the form of the body, or that of the teeth. Gouan, of Montpelier, is another ichthyologist who has attempted to unite and improve the systems of Artedi and Linnæus. The authors to whom we have thus referred, excepting Belon, Rondelet, and Gronovius, published their works without any regular series of plates; but there are others who have given very valuable figures of fishes, as Seba, in his collection of the subjects of natural history; Catesby, in his Natural History of Carolina; Broussonet, in his Ichthyologia; and Bloch, in his Natural History of Fishes, published at Berlin, in German, and afterwards reprinted in 1785, in French, as a part of the Histoire Naturelle de Buffon. The original work of Bloch includes about 600 species of fishes, beautifully colored. La Cépède, the friend and continuator of Buffon, also executed an elaborate and extensive work on the natural history of fishes. He divides them into two secondary classes, viz. the cartilaginous and the osseous; each consisting of four divisions, taken from the combinations of the presence or absence of the operculum, and of the branchial membrane: thus, according to this system, the first division of the cartliaginous includes those fishes which have neither operculum nor branchial membranes; the second, which have no operculum, but a membrane; the third, which have an operculum, but no membrane; and, the fourth, those that have both. The same characters, stated in an inverse order, determine the divisions of the osseous species. Each of these divisions is distributed into the Linnæan orders, and these again are divided into the Linnæan genera.

In the Linnæan system the fins of fishes are the foundation of the first four orders, and are named from their situation on the animal, viz. the dorsal or back-fins; the pectoral or breast-fins; the ventral or belly-fins; the anal or vent-fin; and the caudal or tail-fin. The ventral-fins are considered by our great naturalist as analogous to feet in quadrupeds. The other two orders are formed from the nature of the gills: thus,

LINNÆAN ORDERS.

I. Apodes are fishes destitute of ventral fins.

II. Jugulares are fishes that have ventral fins before the pectoral.

III. Thoracici are fishes that have ventral fins under the pectoral.

IV. Abdominales are fishes that have ventral fins behind the pectoral.

V. Branchiostegous are fishes that have gills destitute of bony rays.

VI. Chondropterygious are fishes that have cartilaginous gills.

The generic character is derived from the shape of the body, the covering, figure, structure, and parts of the head, but principally from the branchiostegous membrane; and the specific character from the cirri, jaws, fins, spines, lateral line, digitated appendages, tail, and color.

In Cuvier's and Blumenbach's systems the last two orders are included in the order pisces cartilagenei, or cartilaginous fishes, which differ from others in having a cartilaginous instead of a bony skeleton (see CARTILAGINOUS). This method is adopted also in Dr. Shaw's General Zoology.

CUVIER'S SYSTEM may be thus exhibited:

(A) CARTILAGINOUS FISHES.

Order I. Chondropterygii; having no gill-cover; an uterus, with two oviducts.

1. Petromyzon, lamprey.
2. Gastrobranchus.
3. Raia, skate, torpedo, stingray.
4. Squalus, shark, saw-fish.
5. Lophius, sea-devil, frog-fish.
6. Balistes, file-fish.
7. Chimæra.

II. Branchiostegi; having a gill cover.

1. Accipenster, sturgeon, beluga.
2. Ostracion, trunk-fish.
3. Tetrodon.
4. Diodon, porcupine-fish.
5. Cyclopterus, lumpsucker.
6. Centriscus.
7. Syngathus, pipe-fish.
8. Pegasus.

(B) BONY FISHES, divided according to the situation of their fins.

Order I. Apodes; no ventral fins.

1. Muræna, eel kind.
2. Gymnotus, electrical eel.
3. Anarrhichas, sea-wolf.
4. Xiphias, sword-fish.
5. Ammodites, launce.
6. Ophidium.
7. Stromateus.
8. Trichiurus.

II. Thoracici; ventral fins directly under the thoracic.

1. Echeneis, sucking fish.
2. Coryphæna, dorado.
3. Zeus, dory.
4. Pleuronectes, flounder, plaice, dab, halibut, sole, turbot.
5. Chæladon.
6. Sparus.
7. Perca, perch.
8. Scomber, mackarel, bonito, tunny.
9. Mullus, mullet, &c. &c.

III. Abdominales; ventral fins behind the thoracic; chiefly inhabit fresh water.

1. Cobitis, loach.
2. Silurus.
3. Salmo, salmon, trout, smelt.
4. Esox, pike.
5. Clupea, herring, sprat, shad.
6. Cyprinus, carp, tench, gold fish, minnow, &c. &c.

IV. Jugulares; ventral fins in the front of the thoracic.

1. Gadus, haddock, cod, whiting, ling.
2. Uranoscopus, stargazer.
3. Blennius, blenny.
4. Callionymus, dragonet.
5. Trachinus, weaver.

PISCES, in astronomy, the twelfth sign or constellation of the zodiac. The stars of this constellation in Ptolemy's catalogue are thirty-eight, in Tycho's thirty-six, in Hevelius's thirty-nine, in the Britannic Catalogue, 113. See ASTRONOMY.

PISCIDIA, a genus of the decandria order and diadelphia class of plants; natural order thirty-second, papilionaceæ. There are two species, viz.

1. P. Carthaginiensis, with oblong oval leaves, is a native of the West Indies. It differs from the erythrina only in the shape and consistence of the leaves, which are more oblong and stiffer; but in other respects they are very similar.

2. P. erythrina, the dog-wood tree, grows plentifully in Jamaica, where it rises to twenty-five feet or more; the stem is almost as large as a man's body, covered with a light colored smooth bark, and sending out several branches at the top without order; the leaves are about two inches long, winged with oval lobes. The flowers are of the butterfly kind, and of a dirty white color; they are succeeded by oblong pods, with four longitudinal wings, and jointed between the cells which contain the seeds. Both species are easily propagated by seeds; but require artificial heat to preserve them in this country. The negroes in the West Indies make use of the bark of this species to intoxicate fish. When gentlemen have an inclination to divert themselves with fishing, or rather with fish-hunting, they send each of them a negro slave to the woods, to fetch some of the bark of the dog-wood tree. This bark is next morning pounded very small, put into old sacks, carried into rocky parts of the sea, steeped till thoroughly soaked with salt water, and then well squeezed by the negroes to express the juice. This juice immediately colors the sea with a reddish hue; and, being of a poisonous nature, will in an hour make the fishes, such as groopers, rock-fish, old wives, Welshmen, &c., so intoxicated, as to swim on the surface of the water, quite heedless of the danger; the gentlemen then send in their negroes, who pursue, swimming and diving, the inebriated fishes, till they catch them with their hands; their masters standing by, on high rocks, to see the pastime. It is remarkable that, though this poison kills millions of the small fry, it has never been known to impart any bad quality to the fish which have been caught in consequence

of the intoxication. The wood of this tree, although pretty hard, is only fit for fuel; and even for this purpose the negroes very seldom employ it. The bark is rough, brown, and thick; the tree sends forth a considerable number of branches, and is well clothed with leaves, which resemble those of the pea, are thick, cottony, and of a deep green. The bark used for the above-mentioned purpose is chiefly that of the roots.

PISCINA, in antiquity, a large basin in a public place or square, where the Roman youth learned to swim; and which was surrounded with a high wall, to prevent filth from being thrown into it. This word is also used for a lavatory among the Turks, placed in the middle court of a mosque, or temple, where the mussulmans wash themselves before they offer their prayers.

PISCO, a seaport town of the province of Ica, Peru. It was formerly a large and rich place; but was taken and sacked in 1624 by some piratical adventurers, and afterwards in 1686 by the buccaneers. In 1687 it was destroyed by an earthquake, the sea completely inundating it. The inhabitants then removed to the place where it now stands. The whole town consists of 300 families, chiefly mestizoes, mulattoes, and blacks; the whites being much the smallest number The road of Pisco is capacious enough to hold a royal navy, but open towards the north; the wind, however, is rarely in that quarter, and never dangerous. 118 miles south of Lima.

PISGAH, or PHASGAH, a mountain on the other side Jordan, joined to Abarim and Nebo, and running south to the mouth of the Arnon; from which Moses had a view of the promised land, and where he died, after appointing Joshua his successsor. Wells takes Pisgah and Nebo to be different names of the same mountain, a part or branch of the mountain Abarim. Or that the top of Nebo was peculiarly called Pisgah; or some other part of it cut out in steps, as the primitive word denotes: and thus it is rendered by Aquila, by a Greek word signifying cut out.

PISH, *interj.* & *v. a.* A contemptuous exclamation. This is sometimes spoken and written pshaw. 'I imagine them formed by chance,' says Dr. Johnson; but see PSHAW. An expression of contempt: to express contempt.

> There was never yet philosopher
> That could endure the toothach patiently;
> However they have writ the stile of Gods,
> And make a *pish* at chance or sufferance.
> *Shakspeare.*

She frowned and cried *pish*, when I said a thing that I stole. *Spectator.*

If you shall give way to any of these vicious courses, ye shall grieve the Holy Spirit of God, and that will be a shameful sin of ingratitude in you, how slight soever it may seem to a carnal heart, and by such a one may be past over, and *pisht* at, in imitation of the careless note of Pharaoh! *Bp. Hall.*

He turned over your Homer, shook his head, and *pished* at every line of it. *Pope.*

PISIDIA, an inland country of Asia Minor, between Phrygia, Pamphylia, Galatia, and Isauria. Mela 1. c. 2. Strabo xii. Acts xiii. 14—52.

PISIS, a native of Thespia, who obtained great influence among the Thebans, and acted with great zeal and courage in defence of their liberties. He was at last taken prisoner by Demetrius, who made him governor of Thespia.

PISISTRATIDÆ, the two sons of Pisistratus, viz. Hipparchus and Hippias, who rendered themselves as illustrious as their father. They governed with great moderation; but the name of tyrant or sovereign being insupportable to the Athenians, Harmodius and Aristogiton conspired against them; Hipparchus was murdered, and Hippias was at last expelled by the united efforts of the Athenians and their allies. The rest of the Pisistratidæ followed him in his banishment; and after they had refused to accept the liberal offers of the princes of Thessaly and the king of Macedonia, who wished them to settle in their respective territories, they retired to Sigæum, which their father had, in the summit of his power, conquered and bequeathed to his posterity. The Pisistratidæ were banished from Athens about eighteen years after the death of Pisistratus.

PISISTRATUS, an Athenian, who early distinguished himself by his valor in the field, and by his address and eloquence at home. After he had rendered himself the favorite of the populace by his liberality, and by the intrepidity with which he had fought their battles, particularly near Salamis, he resolved to make himself sovereign of his country. Every thing seemed favorable to his ambitious views; but Solon alone opposed him, and discovered his duplicity before the public assembly. He was twice banished, and, upon his being the third time received by the people of Athens as their sovereign, he sacrificed to his resentment the friends of Megacles, but did not lose sight of the public good; and, while he sought the aggrandisement of his family, he did not neglect the dignity and the honor of the Athenian name. He died about A. A. C. 528, after he had enjoyed the sovereign power at Athens for thirty-three years, and was succeeded by his son Hipparchus. Pisistratus claims our admiration for his justice, his liberality, and his moderation. It is to his labors that we are indebted for the preservation of the poems of Homer; and he was the first, according to Cicero, who introduced them at Athens in the order in which they now stand. He also established a public library at Athens; and the valuable books which he had diligently collected were carried into Persia when Xerxes made himself master of Athens.

PIS'MIRE, *n. s.* Sax. mẏɲa; Belg. *pismiere.* Mr. Thomson thinks of Teut. *maur*, and *fys*, bustle. An ant; an emmet.

Prejudicial to fruit are *pismires*, caterpillars, and mice. *Mortimer.*

> His cloaths, as atoms might prevail,
> Might fit a *pismire* or a whale. *Prior.*

PISMIRE. See FORMICA and TERMES.

PISO (Lucius Calpurnius), surnamed Frugi on account of his frugality, was tribune of the people, A. A. C. 149, and afterwards consul. During his tribuneship he published a law against extortion, entitled Lex Calpurnia de Pecuniis repetundis. He happily ended the war in Sicily. To reward the services of one of his sons, who

had distinguished himself in that expedition, he left him by his will a golden crown, weighing three pounds.

Piso (Caius Calpurnius), a Roman consul, who, in the year 67 B. C., was author of the law which forbad canvassing for public offices, entitled Lex Calpurnia de Ambitu. He displayed all the firmness worthy of a consul in one of the most stormy periods of the republic; and prevented the people from raising Marcus Palicanus, a man of no merit, to the consular dignity.

Piso (Cneius Calpurnius), was consul in the reign of Augustus, and governor of Syria under Tiberius, whose confidant he was. It is said that by the order of this emperor he caused Germanicus to be poisoned. Being accused of that crime, and seeing himself abandoned by every one, he laid violent hands on himself A. D. 20. He was a man of insupportable pride and excessive violence. Of this many instances are recorded, but the following is the most horrible. Having ordered a soldier to be executed, because he had left the camp with another soldier and returned without him, the other soldier presented himself to the centurion, who, finding he was not murdered, stopped the execution, and all three went to Piso, amidst the joyful applause of the whole army. Whereupon Piso put a stop to their joy, by ordering all three to be put to death.

Piso (Lucius), a Roman senator, who attended the emperor Valerian in his unfortunate expedition into Persia, and, after his capture, proclaimed himself emperor; but was defeated, taken prisoner, and put to death by Valens, A. D. 261.

PISON, in ancient geography, the first of the four rivers that watered the garden of Eden, which Moses describes as 'encompassing the whole land of Havilah, where there is gold,' &c. (Gen. ii. 11, 12). Some suppose the Pison to be the Ganges; others, particularly Calmet and Reland, take it to be the Phasis, which runs north through Colchis (which they suppose to be Havilah), from near the head of the Euphrates to its exit in the Euxine Sea; but these great commentators are evidently mistaken, for the Phasis, instead of rising near the head of the Euphrates, and running north-west, has its source about 350 miles north of the head of the Euphrates, and runs south-west into the Euxine. The conjecture of Bochart and others appears to be more probable, that the Pison is the western branch of the divided streams of the Tigris and Euphrates, which runs along the side of Havilah in Arabia, and encompasses an extensive territory.

PISONIA, in botany, fingrigo, a genus of the diœcia order and polygamia class of plants; natural order nyctagineæ: CAL. scarcely any: COR. bell-shaped; five-cleft; stamens five or six; pistil one: CAPS. superior, one-celled; valveless: male and female on the same or on different plants. Species five.

PISSASPHALTUM, earth pitch; a fluid, opaque, mineral body, of a thick consistence, strong smell, readily inflammable, but leaving a residuum of grayish ashes after burning. It arises out of the cracks of the rocks, in several places in the island of Sumatra, and some other places in the East Indies, where it is much esteemed in paralytic disorders. There is a remarkable mine of it in the island of Bua, and abbe Fortis says, that the pissasphaltum of Bua is correspondent to that fossil production, which, by Hasselquist, is called mumia minerale, and mumia nativa Persiana by Kœmpfer, and which the Egyptians made use of to embalm their kings. 'Mumiahi, or native Persian mummy,' says Kœmpfer, 'proceeds from a hard rock in very small quantity. It is a bituminous juice, that transudes from the stony superficies of the hill, resembling in appearance coarse shoemakers' wax, as well in its color as in its density and ductility. While adherent to the rock it is less solid, but is formed by the warmth of the hands. It is easily united with oil, but repels water; it is quite void of smell, and very like in substance to the Egyptian mummy. When laid on burning coals, it has the smell of sulphur tempered a little with that of naphtha, not disagreeable. There are two kinds of this mummy; the one is valuable for its scarcity and great activity. The native place of the best mummy is in the province of Daraab. It is found in a narrow cave, not above two fathoms deep, cut like a well out of the mass, at the foot of the ragged mountain Caucasus.' This description agrees perfectly with the pissasphaltum, or fossil mummy of Bua. Linnè believes it would be very good for wounds, as the oriental mumia is, and like the pitch of Castro, which is frequently used by the Roman surgeons for fractures, contusions, and in many external applications.

PISTA'CHIO, *n.s.* Fr. *pistache;* Ital. *pistacchi;* Lat. *vistachia.*

Pistachios, so they be good, and not musty, joined with almonds, are an excellent nourisher. *Bacon.*

The *pistachio* is of an oblong figure, pointed at both ends, about half an inch in length; the kernel is of a green colour and a soft and unctuous substance, much like the pulp of an almond, of a pleasant taste: *pistachios* were known to the ancients, and the Arabians call them pestuch and festuch, an we sometimes festich nuts. *Hill*

Pistachio, or Pistachia. See Pistacia.

PISTACIA, turpentine-tree, pistachia nut and mastich tree; a genus of the pentandria order and diœcia class of plants; natural order fiftieth, amentaceæ. There are nine species, of which the most remarkable are,

1. P. lentiscus, the common mastich tree, grows naturally in Portugal, Spain, and Italy. Being an evergreen, it has been preserved in this country, in order to adorn the green-houses. In the countries where it is a native it rises to the height of eighteen or twenty feet, covered with a gray bark on the stem; but the branches, which are very numerous, are covered with a reddish-brown bark, and are garnished with winged leaves, composed of three or four pairs of small spear-shaped lobes, without an odd one at the end. This species is commonly propagated by laying down the branches, though it may also be raised from the seed in the manner directed for the pistachia nut-tree; but this, being more tender than any of the other sorts, requires to

be constantly sheltered in winter, and to have a warm situation in summer. Pistachia nuts are moderately large, containing a kernel of a pale greenish color, covered with a reddish skin. They have a pleasant, sweet, unctuous taste, resembling that of almonds; and they abound with a sweet and well-tasted oil, which they yield in great abundance on being pressed after bruising them; they are reckoned amongst the analeptics, and are wholesome and nutritive; and are by some esteemed very proper to be prescribed by way of restoratives, eaten in small quantity, to people emaciated by long illness.

2. P. orientalis, the true mastich tree of the Levant, from which the mastich is gathered, has been confounded by most botanical writers with the common mastich tree, above described, though there are considerable differences between them. The bark of the tree is brown; the leaves are composed of two or three pairs of spear-shaped lobes, terminated by an odd one; the outer lobes are the largest; the others gradually diminish, the innermost being the least. These turn of a brownish color towards the autumn, when the plants are exposed to the open air; but if they are under glasses they keep green. The leaves continue all the year, but are not so thick as those of the common sort, nor are the plants so hardy. In the island of Chio the officinal mastich is obtained most abundantly; and, according to Tournefort, by making transverse incisions in the bark of the tree, whence the mastich exudes in drops, which are suffered to run down to the ground, when, after sufficient time is allowed for their concretion, they are collected for use. Mastich is brought to us in small, yellowish, transparent, brittle tears, or grains; it has a light agreeable smell, especially when rubbed or heated; on being chewed, it first crumbles, soon after sticks together, and becomes soft and white, like wax, without impressing any considerable taste. No volatile oil is obtained from this substance when distilled with water. Pure alcohol and oil of turpentine dissolve it; water scarcely acts upon it; though by mastication it becomes soft and tough, like wax. When chewed a little while, however, it is white, opaque, and brittle, so as not to be softened again by chewing. The part insoluble in alcohol much resembles in its properties caoutchouc. It is considered to be a mild corroborant and astringent; and, as possessing a balsamic power, it has been recommended in hæmoptysis proceeding from ulceration, leucorrhœa, debility of the stomach, and in diarrhœas and internal ulcerations. Chewing this drug has likewise been said to have been of use in pains of the teeth and gums, and in some catarrhal complaints; it is, however, in the present day, seldom used either externally or internally. The wood abounds with the resinous principle, and a tincture may be obtained from it, which is esteemed in some countries in the cure of hæmorrhages, dysenteries, and gout.

3. P. terebinthus, the pistachia tree, grows naturally in Arabia, Persia, and Syria, whence the nuts are annually brought to Europe. In those countries it grows to the height of twenty-five or thirty feet; the bark of the stem and old branches is of a dark russet color, but that of the young branches is of a light brown. These are garnished with winged leaves, composed sometimes of two, at other times of three, pairs of lobes, terminated by an odd one; these lobes approach towards an oval shape, and their edges are turned backward: and these, when bruised, emit a smell similar to that of the shell of the nut. Some of these trees produce male and others female flowers, and some have both male and female on the same tree. The male flowers come out from the sides of the branches, in loose bunches or catkins. They have no petals, but five small stamina crowned by large four-cornered summits filled with farina; and, when this is discharged, the flowers fall off. The female flowers come out in clusters from the sides of the branches; they have no petals, but a large oval germen supporting three reflexed styles, and are succeeded by oval nuts. This species is propagated by its nuts; which should be planted in pots filled with light kitchen-garden earth, and plunged into a moderate hot-bed to bring up the plants; when these appear, they should have a large share of air admitted to them, and by degrees they should be exposed to the open air, which at last they will bear in all seasons, though not without great danger of being destroyed in severe winters.

PISTIA, in botany, a genus of the hexandria order and gynandria class of plants; natural order fifty-fourth, miscellaneæ.

PISTIL, among botanists, the little upright column which is generally found in the centre of every flower. According to the Linnæan system, it is the female part of generation, whose office is to receive and secrete the pollen, and produce the fruit. It consists of three parts, viz. germen, stylus, and stigma. See BOTANY.

PISTILLATION, *n. s.* Lat. *pistillum.* The act of pounding in a mortar.

The best diamonds we have are comminuble, and so far from breaking hammers, that they submit unto *pistillation*, and resist not an ordinary pestle.

Browne's Vulgar Errours.

PISTOJA, a large town of Italy, in the grand duchy of Tuscany, situated on the declivity of the Appennines, near the Ombrone. It stands in a beautiful plain, surrounded with old walls, and defended by a decayed castle. Its population does not exceed 10,000; but there are few towns in Italy of which the streets are so spacious, or the dwelling-houses so well built. It contains, however, few public buildings of note: but is the seat of an academy, two public libraries, and a museum. Here are also manufactures of silk, cotton, leather, and hardware, on a small scale. The mountains of the vicinity contain mines of copper, and of crystals known by the name of Pistoja diamonds. The Neapolitans were defeated here by the Austrians, in April 1815. Fourteen miles N.N.W. of Florence; and forty-two S.S.W. of Bologna.

PISTOL, *n. s.* & *v. a.* Fr. *pistole, pistolet*; Span. and Ital. *pistola.* A small handgun; to shoot with a pistol.

Three watch the door with *pistols*, that none should issue out.

Shakspeare. Merry Wives of Windsor.

The whole body of the horse passed within *pistol*-shot of the cottage. *Clarendon.*

Quicksilver discharged from a *pistol* will hardly pierce through a parchment. *Browne's Vulgar Errours.*

A woman had a tubercle in the great canthus of the eye, of the bigness of a *pistol*-bullet. *Wiseman.*

How Verres is less qualified to steal,
With sword and *pistol*, than with wax and seal.
Young.

PISTOL, the smallest kind of fire-arms, borne at the saddle-bow, on the girdle, and in the pocket. Pistol barrels are forged in one piece, two at a time, joined by their muzzles, and are bored before they are cut asunder; whereby there is a saving of time and labor, and a greater certainty in the bore being the same in both. The method of welding, boring, polishing, &c., is the same with that of guns.

PISTOLE', *n. s.* French *pistole*. A coin of many countries and many degrees of value, as some have thought from Pistoia, an ancient republic of Italy.

I shall disburden him of many hundred *pistoles*, to make him lighter for the journey. *Dryden.*

PISTOLE, a gold coin, struck in Spain and in several parts of Italy, Switzerland, &c. The pistole has its augmentations and diminutions, which are quadruple pistoles, double pistoles, and half pistoles. See COINS.

PISTOLET', *n. s.* Diminutive of pistol. A little pistol.

Those unlickt bear-whelps, unfiled *pistolets*,
That, more than cannon-shot, avails or lets.
Donne.

PISTON, *n. s.* Fr. *piston*. The moveable part in several hydraulic machines; popularly the sucker. See STEAM ENGINE.

At the beginning of the operation, if the leathers be dry, the *piston* will not exhaust the air sufficiently, and the water will not rise; but, if a little water be poured upon the *piston*, it will swell the leathers, and, causing them to fit close, thus make the *piston* act. *Immison's Elements.*

PISTORIUS (John), M. D. and D. D., was born at Nidda in 1546. He studied medicine, and was admitted M. D. with applause; but, his prescriptions not being attended with success, he quitted that profession, and studied the law. His talents procured him the appointment of counsellor to Ernest Frederick, margrave of Baden-Dourlach. He had embraced the Protestant religion; but some time after returned to the communion of the church of Rome. He became afterwards one of the emperor's counsellors, provost of the cathedral of Breslaw, and domestic prelate to the abbot of Fulda. He wrote, 1. Several Controversial Tracts against the Lutherans; 2. Artis Cabalisticæ Scriptores, printed at Basle, 1587, a scarce and curious collection; 3. Scriptores rerum Polonicarum; 4. Scriptores de rebus Germanicis, in 3 vols. folio, from 1603 to 1613. This is a curious and scarce performance. The author died in 1608, aged fifty-two.

PISUM, pease, a genus of the decandria order, and diadelphia class of plants: natural order thirty-second, papilionaceæ. The species are numerous.

1. P. Americanum, commonly called Cape Horn pea, with an angular trailing stalk, whose lower leaves are spear-shaped, sharply indented, and those at the top narrow pointed.

2. P. humile, the dwarf pea, with an erect branching stalk and leaves, having two pairs of round lobes.

3. P. maritimum, the sea pea, with foot-stalks, which are plain on their upper side, an angular stalk, narrow-pointed stipulæ, and foot-stalks bearing many flowers.

4. P. ochrus, with membranaceous running foot-stalks, having two leaves and one flower upon a foot-stalk.

5. P. sativum, the greater garden-pea, whose lower stipulæ are roundish, indented, with taper foot-stalks, and many flowers on a foot-stalk. A great variety of garden-pease are now cultivated in Britain, which are distinguished by the gardeners and seedsmen, and have their different titles; but as many of these have been seminal variations, so if they are not very carefully managed, by taking away all those plants which have a tendency to alter before the seeds are formed, they will degenerate into their original state; therefore all those persons who are curious in the choice of their seeds look carefully over those which they design for seeds at the time when they begin to flower, and draw out all the plants which they dislike from the other. This is what they call rogueing their pease; meaning hereby the taking out all the bad plants from the good, that the farina of the former may not impregnate the latter; to prevent which they always do it before the flowers open. By thus diligently drawing out the bad, reserving those which come earliest to flower, they have greatly improved their pease of late years, and are constantly endeavouring to get forward varieties.

PIT, *n. s.* & *v. n.* Sax. pit; Dan. *pit;* Fr. *puit*. A hole in the ground; ditch; abyss; profundity; any large excavation or area, as the middle of a theatre; area of a cock-fight, &c. the grave; any hollow or dent: to pit, is to press into; to mark with hollows or dints.

O Lord, think no scorn of me, lest I become like them that go down into the *pit*. *Psal.* xxviii. 1.

Tumble me into some loathsome *pit*,
Whe'renever man's eye may behold my body.
Shakspeare.

Our enemies have beat us up to the *pit*;
It is more worthy to leap in ourselves,
Than tarry till they push us. *Id. Julius Cæsar.*

Pits upon the sea-shore turn into fresh water, by percolation of the salt through the sand; but, in some places of Africa, the water in such *pits* will become brackish again. *Bacon.*

Into what *pit* thou seest
From what height fallen. *Milton.*

Make him glad, at least, to quit
His victory, and fly the *pit*. *Hudibras*

Let Cully, Cockwood, Fopling charm the *pit*,
And in their folly shew the writer's wit. *Dryden.*

They managed the dispute as fiercely as two game-cocks in the *pit*. *Locke on Education.*

An anasarca, a species of dropsy, is characterised by the shining and softness of the skin, which gives way to the least impression, and remains *pitted* for some time. *Sharp.*

PIT'APAT, *n. s.* 'Probably from Fr. *pas a pas*, or *patte patte*.'—Johnson. Or a frequentative of PAT. A flutter; palpitation; light, quick step.

Now I hear the *pitapat* of a pretty foot through the dark alley: no, 'tis the son of a mare that's broken loose, and munching upon the melons. *Dryden.*

A lion meets him, and the fox's heart went *pitapat*. *L'Estrange.*

PITCAIRNE (Archibald), M. D., an eminent physician and ingenious poet, descended from an ancient family in Fifeshire. He was born in Edinburgh on the 25th of December, 1652. He commenced his studies at Dalkeith; and thence removed to the university of Edinburgh, where he improved himself in classical learning, and completed a regular course of philosophy. The law seems to have been his own choice; and to this science he turned his attention with an ardor peculiar to himself. He pursued it with so much intenseness that his health began to be impaired. On this account, his physicians advised him to set out for the south of France. By the time he reached Paris, he was happily so far recovered that he determined to renew his studies; but being informed that there was no able professor of law in that city, and finding several gentlemen of his acquaintance engaged in the study of physic, he went with them to the lectures and hospitals, and employed himself in this manner for several months till his affairs called him home. On his return he applied himself chiefly to the mathematics. His intimacy with Dr. D. Gregory, the celebrated mathematical professor, began about this time. Pitcairne's progress in mathematics was rapid, and correspondent to his other pursuits. His improvements on the method of infinite series then adopted, which Dr. Wallis of Oxford afterwards published, were a conspicuous and early proof of his abilities in this science. He however resolved to devote himself entirely to medicine, and with this view soon returned to Paris, where he cultivated the object of his pursuit with his natural enthusiasm, and with a steadiness from which he could not be diverted. In 1680 he received from the faculty of Rheims the degree of M. D.; which, on the 7th August, 1699, was likewise conferred on him by the university of Aberdeen; both being attended with marks of peculiar distinction. Soon after his graduation at Rheims, he returned to Edinburgh, where, on the 29th of November, 1681, the Royal College of Physicians was instituted; and his name, amongst others, graced the original patent from the crown. In his Solutio Problematis de Inventoribus, the treatise above alluded to, he discovers a high degree of medical literature, and makes use of it to vindicate Dr. Harvey's claim to the discovery of the circulation of the blood. During his residence in Scotland, his reputation became so considerable that, in 1691, the university of Leyden solicited him to fill the medical chair then vacant. Dr. Pitcairne's well known political principles excluded him from promotion at home: he therefore accepted the invitation from abroad; and on the 26th of April, 1692, delivered at Leyden his elegant and masterly inaugural, Oratio: qua ostenditur medicinam ab omni philosophorum secta esse liberam. He discharged the duties of his office at Leyden so as to answer the most sanguine expectations. At the close of the session he visited his native country, intending to return in time for his lectures. But, marrying in Scotland, he declined the office, and was appointed titular professor of medicine in the university of Edinburgh. In a science so slowly progressive as that of medicine Dr. Pitcairne did a great deal. He not only exploded many false notions of the chemists and Galenists, which prevailed in his time, but many of those too of his own sect. He proved the continuity of the arteries and veins; and seems to have been the first who showed that the blood flows from a smaller capacity into a larger; that the aorta, with respect to the arterial system, is the apex of a cone. He collected one of the finest private libraries in the world; which was purchased after his death by Peter the Great. Notwithstanding the fatigues he underwent in the exercise of his profession, his constitution was naturally delicate. About the beginning of October, 1713, he became affected with his last illness; and on the 23d he died. Some anonymous publications are attributed to Dr. Pitcairne, particularly a treatise De Legibus Historiæ Naturalis, &c.; but the only ones he thought proper to legitimate are his Dissertationes Medicæ, and a short essay De Salute.

PITCAIRN'S ISLAND, an island in the South Pacific Ocean, without a river or harbour. It is situated in long. 133° 21′ W., and lat. 25° 2′ S., and in 1808 it was discovered by an American vessel which touched at this island, that it had been resorted to as a last retreat, by such of the mutineers of the Bounty as left Otaheite, to settle on some uninhabited island, out of the reach of further pursuit.

We have seen an extract from the Journal of captain King of the Elizabeth, who visited this island in 1819, which we think will interest our readers:—'On the 2d of March we saw Pitcairn's Island: at 5 P.M. of the same day we were within half a league of it, and could not persuade ourselves, from the barren appearance of the hill, that any persons who had ever seen the fertile hills and dales of Great Britain would ever fix their residence among these barren mountains. We stood off and on all night, under easy sail, and showed a light in the main-rigging, which was answered by two large fires on shore. A young girl, named Dorothy Young (as we afterwards were told), had been at work at a plantation opposite to the ship, ran to the village, and told them of our arrival, in consequence of which they made the fires in answer to our light. About 6 A.M., on Wednesday, March 3d, I stood the ship close in to what the inhabitants call ship-landing place (from the circumstance of the Bounty being hauled on shore and burnt at this place), in expectation that some of the inhabitants would probably come off to me. I hove too with our head off, and prepared a boat to go on shore; in a few minutes after we saw a boat with nine men come out from amongst the rocks, through a tremendous surf. I now

sent my boat to meet them, and tow them on board. When they came alongside, they ascended the ship's side with much good humor, and came aft on the quarter-deck where I was, and, taking me by the hand, gave it a hearty shake, and said, 'How do you do, captain?' They then asked the ship's name, my name, where bound, whence from, and made many other trifling enquiries, in very good English. After satisfying them respecting these matters, I invited them into the cabin, and set before them some salt-beef, grog, biscuit and porter, with which they seemed pleased. Putting their hands before them in the position of prayer, and saying grace, they began to refresh themselves, and were much pleased with the porter. While they were eating I had leisure to survey their fine open countenances, which, notwithstanding their exposure to the sun, were truly British.

'They were nine young men, the offspring of the deluded crew of the Bounty, most of them standing six feet high, very muscular and agile, of an engaging deportment and open disposition. After their repast they returned thanks to God in the same pious manner as before. They then went on deck, where they gave surprising proofs of their agility, by going aloft, jumping overboard, and swimming round the ship, while it was going through the water at the rate of two knots per hour. I now prepared to go on shore, and took the surgeon with me. Five of the natives accompanied us to assist in landing, the others remained on board till my return. When I got near the shore I found the surf so violent that I durst not attempt with my boat to go through it. I went into theirs, when one of them taking hold of me bid me not fear, for should the boat upset, he would take me safe on shore. We now entered the surf, when, to my great surprise, a number of young women and children came half way into the surf to assist in landing the boat. These women ventured far beyond their depth, and assisted in bearing the boat up, by swimming and sustaining it with their hands. We landed in safety, and were immediately met by John Adams, a hearty corpulent old man, who like the rest was naked, with the exception of a piece of cloth round his middle. He invited us to his house, for which we set out directly, accompanied by all the population of the island. Our way lay up a very steep hill, and along a footpath so narrow that they were actually obliged to carry the doctor up. When we attained the summit of the hill, we had a fine road through the woods; and after crossing two valleys, which abounded with cocoa-nut trees, we arrived at the village situated in a beautiful valley, in which were seven houses, each of which had a fine lawn before it. Two of the houses had a story above the ground, and all had very clean convenient places for their poultry and pigs. We stopped at the house of Thursday October Christian, the first born on the island, who gave us for dinner a sucking pig, cooked after the Otaheitean manner, two brace of fowls, and plenty of yams and plaintains. After dinner were served up bananas and a species of apple peculiar to the island, which we found very good. Every thing was clean, and conducted with great propriety. Grace was said both before and after dinner; John Adams saying it first, then every one in rotation according to their seniority. After dinner we took a look at the different plantations, and found that most of their labor consisted in raising yams. There was an abundance of plantains and some sugar-cane, from which they extract molasses and liquor.

'In the evening, after supper, they entertained us with an Otaheitean dance, which consisted of various writhings and distortions of the body, by no means obscene, yet in no respect pleasant. While some were dancing, the rest sat down to look on, in company with six sailors belonging to the ship, when suddenly one of the young women jumped up and ran to her brother, saying, 'she would not sit any longer near that naughty man (pointing to one of my sailors), for he wanted her to commit fornication.' I asked the man why he behaved so rude to people that had treated him so well? He told me that it was by mere accident he put his foot against her's, and that he had never spoken to her. After the Otaheitean dance the sailors showed their abilities in dancing, which excited great laughter and diversion. After the dance we were shown to bed; the surgeon and myself slept in the same room. We had each of us a good feather-bed and clean sheets, made from the bark of a tree, where we slept very comfortably all night. In the morning we breakfasted on fowls and a beverage like tea, made from a root similar to the gentian, but which they called ginger. After breakfast we returned to the Ship Landing-place, to endeavour to go on board; but the sea was too high. Davy, as they called the sea, had never been so bad before, excepting once in their remembrance. We were all sitting down in conversation, when a little child ran down to go into the surf. I ran to prevent the child, and so did the wife of Charles Christian, saying at the same time to Diana, the eldest daughter of John Adams, 'Diana, your child will be drowned.' Adams having told me, prior to this, that his daughters were not married, I expressed my surprise to the wife of Christian. Old Adams, hearing this, took me aside, and gave me the following account:—Notwithstanding his paternal care of his daughters, Edward Quintral and Diana had committed an offence against the laws of God, for which he supposed them worthy of death, and accordingly gave orders that they should be shot; but, as no person seemed willing to execute his orders, he made the necessary preparations for executing them himself, when he was strongly opposed by Authur Quintral, who said that though the offence was certainly a great one, and the more so as a similar one had not been committed since the death of Christian, yet he did not conceive it to be a crime worthy of death. The rest being of the same opinion, Adams changed his mind also, but forbade them to marry. Adams, upon this occasion, probably changed his mind through interest; for he will not suffer his daughters to marry for fear of losing their labor in cultivating his plantation. As we could not go on board, I now searched for a watering-place, and found a very convenient one in moderate weather, and with excellent water

'Each family gathered together some poultry, hogs, goats, plantains, and every thing the island produced, and next morning, Davy being milder, we went on board, accompanied by the whole population of the island. As most of them had never seen a ship, they were much pleased, but soon grew sea sick. I now gave them a whale boat in return for their refreshments, some books, razors, combs, and in short every thing they stood in need of; but nothing pleased them so well as the books, as they wished much to read and write. I offered Auther Quintral two claw-hammers, which he refused; and Adams, who was present, told him that it was very improper to refuse any thing their countrymen offered: Auther replied, it was much more improper to take things that they do not want. While Adams was on board the ship, he gave me a brief account of the different occurrences that had taken place upon the island; and, among others, he mentioned his divorcing Christian and his wife, in consequence of having read in the Old Testament that marriages should not be allowed among those who were at all related to each other, and that they had lived separate a long time. After a great deal of conversation upon the subject, I persuaded him to allow Diana, his daughter, to be married to Edward Quintral, and Christian to live with his wife, both of which he promised to do; and, calling Edward to him, he took him by the hand, saying, 'Come here, my son, you shall have my daughter Diana, and to-morrow we shall keep the wedding.' I now gave him some porter, wine, and spirits, to regale themselves with at the wedding. Every person in the ship was so struck with their simplicity of manners, the mildness of their language, and their modest deportment, that they were loaded with presents. They got nearly 200 books, of various descriptions, from the officers and crew;—even the sailors belonging to the ship behaved with a degree of modesty in the presence of these naked females that would have surprised a Joseph Andrews. John Adams now assembled his family in order to take leave, which they did in the most affectionate manner; and so grateful were they for the few things they had received from the ship that they all kneeled down to kiss my hand, which I could by no means permit. I promised, should I come again to the island, that I would bring them some black cattle, and particularly some asses, of which they said they were greatly in want. They now went into their boat with some reluctance, particularly one young man who wished to see his friends in England, but his mother, with tears in her eyes, requested that I would not take away her son; nor were we ourselves free from regret, at leaving a people whom we considered in a moral point of view as far superior to any of the human species we ever beheld.

'I did not hear whether they had found any metals; but I recollected, after leaving the island, that the stones with which they sharpened their tools, appeared to have a yellowish metallic appearance; and also some veins of yellow metal in them. I much regret not having examined them more closely, or bringing a piece with me. One of the sailors gave a shilling to be tied round the neck of one of their children; but before I left the island it was brought to me, to be restored to the donor, observing at the same time that they had no use for it, and it would buy him something when he got to England. Old Adams informed me, when they first settled on the island, that there were plenty of fish; but, for some time before my touching at this place, they could not catch any, and they thought the copper of the Bounty had poisoned them all. The island produces yams, and other esculent roots, for which we could not find names. I presented them on my departure with some pease, barley, flour, orange, melon, pumpkin, celery, and many other seeds, which I had saved during my voyage (intending to give them should I ever touch at the island). Salt is procured among the rocks, the sea being hove into the cavities during the blowing weather is left there, and by the rays of the sun produces salt, a circumstance very common in warm climates. The only birds which I saw were pigeons and sea gulls. George Young carried the Bounty's anvil and swivel from the Ship Landing-place, up the steep foot-path where the doctor was carried up; the anvil was as much as I could well lift, and he says he could have carried the anchor also.'

PITCH, *n. s., v. a.*, & *v. n.*
PITCH'ER,
PITCH'FORK.
} Pret. pight. Fr. *ficher*. Skinner. Lat. *pangere.*—Minsheu, more probably. Position. elevation; length or degree of descent or ascent: hence highest rise; size; stature: to fix; plant; cast; throw: as a neuter verb, to order; fix choice (taking *upon*); fall; light; drop; fall headlong; fix a hut or any temporary abode: a pitcher is a bar or instrument used for pitching stakes. A pitchfork is a fork to throw corn or hay with.

They *pitched* by Emmaus in the plain.
1 Mac.

An hideous rock is *pight*,
Of mighty Magnes stone, whose craggy clift,
Depending from on high, dreadful to sight
Over the waves his rugged arms doth lift.
Spenser.

Then brought she me into this desart vast,
And by my wretched lover's side me *pight*. *Id.*

That infernal monster, having cast
His weary foe into the living well,
'Gan high advance his broad discoloured breast
Above his wonted *pitch*. *Id.*

In setting down the form of common prayer, there was no need to mention the learning of a fit, or the unfitness of an ignorant minister, more than that he, which describeth the manner how to *pitch* a field, should speak of moderation and sobriety in diet.
Hooker.

Mahometes *pitched* his tents in a little meadow.
Knolles.

Stay yet, you vile, abominable tents,
Thus proudly *pight* upon our Phrygian plains.
Shakspeare.

When I dissuaded him from his intent,
I found him *pight* to do it. *Id.*

On Dardan plains the Greeks do *pitch*
Their brave pavilions. *Id. Troilus and Cressida.*

They'll not *pitch* me i' th' mire,
Unless he bid 'em. *Id. Tempest.*

Were the whole frame here,
It is of such a spacious lofty *pitch*
Your roof were not sufficient to contain it.
Shakspeare.

A beauty waning, and distressed widow,
Seduced the *pitch* and height of all his thoughts
To base declension and loathed bigamy. *Id.*

That greate worke, unlesse the seede of Jove,
The deathlesse muses, undertake, maintaines a *pitch* above
All mortall powers. *Chapman.*

He counselled him how to hunt his game,
What dart to cast, what net, what toile to *pitch*.
Fairfax.

Others expectation was raised to a higher *pitch* than probably it would. *Hammond.*

I *pitched upon* this consideration, that parents owe their children, not only material subsistence, but much more spiritual contributions to their mind.
Digby on the Soul.

Our resident Tom
From Venice is come,
And hath left the statesman behind him,
Talks at the same *pitch*,
Is as wise, is as rich,
And just where you left him, you find him.
Denham.

Down they fell,
Driven headlong from the *pitch* of heaven, down
Into this deep. *Milton's Paradise Lost.*

By how much from the top of wondrous glory,
Strongest of mortal men,
To lowest *pitch* of abject fortune thou art fallen.
Milton.

To overcome in battle, and subdue
Nations, and bring home spoils, with infinite
Manslaughter, shall be held the highest *pitch*
Of human glory. *Id.*

It turned itself to Ralpho's shape;
So like in person, garb, and *pitch*,
'Twas hard t' interpret which was which.
Hudibras.

Cannons shoot the highest *pitches*,
The lower we let down their breeches. *Id.*

A free agent will *pitch upon* such a part in his choice, with knowledge certain.
More's Divine Dialogues.

Princes that feared him grieve; concerned to see
No *pitch* of glory from the grave is free. *Waller.*

Pitch upon the best course of life, and custom will render it the most easy. *Tillotson.*

When the victor
Had conquered Thebes, he *pitched* upon the plain
His mighty camp. *Dryden's Knight's Tale.*

The courser o'er the pommel cast the knight;
Forward he flew, and, *pitching* on his head,
He quivered with his feet, and lay for dead.
Dryden.

I translated Chaucer, and amongst the rest *pitched* on the wife of Bath's tale. *Id.*

The covetous man was a good while at a stand; but he came however by degrees to *pitch upon* one thing after another. *L'Estrange.*

When the swarm is settled, take a branch of the tree whereon they *pitch*, and wipe the hive clean.
Mortimer.

To the hills poles must be set deep in the ground, with a square iron *pitcher* or crow. *Id.*

They would wrestle, and *pitch* the bar for a whole afternoon. *Spectator.*

One *pitched* battle would determine the fate of the Spanish continent. *Addison on the War.*

Alcibiades was one of the best orators of his age, notwithstanding he lived at a time when learning was at the highest *pitch*. *Addison.*

PITCH, *n. s.* } Sax. pic; Teut. *pech*; Belg.
PITCH'Y, *adj.* } *pik*; Swed. *beck*; Lat. *pix*; Gr. πιττα, πισσα. A resin, commonly that of the pine, extracted by fire and inspissated: to pitch is to smear with pitch; to darken: pitchy is smeared or impregnated with pitch; resembling pitch; black; dark.

PITCH is a tenacious oily substance, drawn chiefly from pines and firs, and used in shipping, medicine, and various arts: it is more properly tar inspissated by boiling it over a slow fire. See TAR. This part of the process is commonly performed in a still, in order to save an essential oil which arises on boiling, and which is called, from the name of the tree which tar is principally prepared from, oleum pini, and oleum tædæ. It is used in caulking of ships, to fill the chinks or intervals between the planks of their sides, decks, or bottoms. The want of this article might, in cases of real necessity, be supplied by preparations of paint and other substances.

In the island of Trinidad there is a lake of asphaltum, or mineral pitch, which furnishes an inexhaustible supply of this article. When this substance exudes from the ground, it is in the state of liquid tar. The Spaniards found it to answer so well when laid on boiling hot, and mixed with tallow or oil, in the proportion of about 4 lbs. to every 100 lbs. of pitch, that admiral Apodaca, in the year 1797, when the island fell into our possession, received orders to form an establishment for the preparation of this pitch for the use of the navy. It is said to possess the valuable qualities of resisting the worm which abounds in the Gulf of Paria, and of preserving iron. But there appears to be a prejudice against it, of which we know not the foundation.

PITCH'ER, *n. s.* Fr. *picher*; Span. *pichel*. An earthen vessel; a water-pot.

With suddain fear her *pitcher* down she threw,
And fled away. *Spenser.*

Pitchers have ears, and I have many servants;
Besides old Gremio is hearkening. *Shakspeare.*

We read of kings, and gods, that kindly took
A *pitcher* fill'd with water from the brook. *Carew.*

Pyreicus was only famous for counterfeiting all base things; as earthen *pitchers* and a scullery.
Peacham on Drawing.

Hylas may drop his *pitcher*, none will cry,
Not if he drown himself. *Dryden.*

PITCHING, in sea affairs, may be defined the vertical vibration which the length of a ship makes about her centre of gravity; or the movement by which she plunges her head and afterpart alternately into the hollow of the sea. This motion may proceed from two causes: the waves which agitate the vessel; and the wind upon the sails, which makes her stoop to every blast thereof. The first absolutely depends upon the agitation of the sea, and is not susceptible of inquiry; and the second is occasioned by the inclination of the masts, and may be submitted to certain established maxims. When the wind acts upon the sails, the mast yields to its effort, with an inclination which increases in proportion to the length of the mast, to the augmentation of the wind, and to the comparative weight and distribution of the ship's lading. The repulsion of

the water to the effort of gravity, opposes itself to this inclination, or at least sustains it, by as much as the repulsion exceeds the momentum, or absolute effort of the mast, upon which the wind operates. At the end of each blast, when the wind suspends its action, this repulsion lifts the vessel; and these successive inclinations and repulsions produce the movement of pitching, which, when it is considerable, will greatly retard the course, as well as endanger the mast, and strain the vessel.

PITCH-PIPE, an instrument used by vocal practitioners to ascertain the *pitch* of the key in which they are about to sing. It is blown at one end like a common flute, and being shortened or lengthened by a graduated scale, is capable of producing, with mechanical exactness, all the semitonic degrees within its compass.

PITCHSTONE, PEARLSTONE, PUMICE, and OBSIDIAN. All these substances, formerly regarded as distinct, are now included under one species in mineralogy, the character of which is the following: cleavage none; fracture conchoidal, sometimes highly perfect, sometimes less distinct; in the granular masses, the fracture is more or less uneven and splintery; lustre vitreous and resinous; colors black, brown, red, yellow, green, gray, and white; hardness between that of feldspar and quartz; specific gravity 2.3. The variety called *obsidian* possesses the most perfect conchoidal fracture and the highest degree of lustre. Agreeably to the degree of transparency, it is divided into *transparent* and *translucent* obsidian; the former of which is sometimes called *marekanite.* If the high perfection of the conchoidal fracture disappears, the mineral takes the name of *pitchstone.* Pitchstone often contains those faces which are called the faces of distinct concretion; if these are numerous, variously curved, and contain but little matter between them, *pearlstone* is formed. The obsidian is often vesicular, the cavities being small, and keeping a constant direction; if there are a great many of them of larger sizes the whole mass becomes apparently very light, the original color disappears, and gives place to a pearly or silky lustre; and thus arises the variety called *pumice.* The analysis of these varieties presents the following results:—

	Obsidian.	Pitchstone.	Pearlstone.	Pumice
Silex	72.00	73.00	75.25	77.50
Alumine	12.50	14.50	12.00	17.50
Potash } Soda	10	0.00	4.50	3.00
Soda		1.75	0.00	
Oxides of iron and manganese	2.00	1.10	1.60	1.75
Lime	0.00	1.00	0.50	0.00
Water	0.00	8.50	4.50	0.00

Before the blow-pipe, they all melt with more or less facility into a vesicular glass, or they yield an enamel, according to the fusibility of their ingredients. The geological relations of these species are very remarkable. Pitchstone forms mountain masses, and is generally in close connexion with porphyry. Many of the other varieties occur under similar circumstances. Pitchstone veins sometimes occur in sandstone. Pumice and obsidian are among the products of volcanoes. The southern countries of Europe, South America, Mexico, and the Sandwich Islands are rich in the varieties of pitchstone. Pearlstone, in particular, occurs in Hungary, and at Cabo de Gates, in Spain. Obsidian is very frequent in Iceland and Mexico; pumice in the Lipari islands, Teneriffe and Peru. Obsidian is employed for mirrors, vases, snuff-boxes, &c. In Mexico and the Island of Ascension, very sharp fragments are used as tools and weapons. Pumice yields a well known material for grinding and polishing, and is also employed for a filtering stone.

PIT'COAL, *n. s.* Pit and coal. Fossile coal.

The best fuel is peat, the next charcoal made of *pitsoal* or cinders. *Mortimer's Husbandry.*

PIT'FALL, *n. s.* Pit and fall. A pit dug and covered, into which a passenger may fall unexpectedly.

Poor bird! thoud'st never fear the net nor lime,
The *pitfall* nor the gin. *Shakspeare. Macbeth.*

These hidden *pitfalls* were thick at the entrance of the bridge, so that throngs of people fell into them. *Addison.*

PITH, *n. s.*
PITH'INESS
PITH'LESS, *adj.*
PITH'Y.
} Saxon piꝺ; Belg. *pitte;* Qu. Gr. πηκτος. The medulla or marrow of plants; hence strength; fire; energy; weight; important or principal part of a discourse or business: pithiness is chiefly used in the metaphorical senses: pithy and pithless for abundant in, or destitute of, pith, force, or strength.

That's my *pith* of business
'Twixt you and your poor brother. *Shakspeare.*

In all these, Goodman Fact was very short, but *pithy;* for he was a plain home-spun man. *Addison.*

PITHEA LAPPMARK, a division of Swedish Lapland, extending from Norway to West Bothnia, along the river Pithea, and now forming part of the government of Umea. It is about 140 miles in length, and sixty-five in breadth. The eastern part has a good soil and climate, but on the last enumeration there were only 1045 inhabitants, of whom 932 were Laplanders; at the present day they cannot exceed 2000. The mountain Nasa Fjæl has mines of lead and silver.

PITHECUSA, an island of Italy, on the coast of Etruria, anciently called Ænaria, with a town so named on the top of a mountain. It was subjected to earthquakes, and had a volcano; which led mythologists to say that the giant Typhon was buried alive under the mountain, and struggled at such times to throw off his burden. Ovid, Plin., &c.

PITHO, in mythology, the goddess of persuasion among the Romans, the daughter of Mercury and Venus. She was represented with a

diadem on her head, to intimate her influence over the heart of man. One of her arms appeared raised as in the attitude of an orator haranguing a public assembly; and with the other she holds a thunderbolt and fetters, made with flowers, to signify the powers of reasoning and the attractions of eloquence. A caduceus, as a symbol of persuasion, appears at her feet, with the writings of Demosthenes and Cicero, the two most celebrated orators among the ancients.

PITHOLAUS AND LYCOPHRON, two nobles of Pheræ, who killed the tyrant Alexander, and seized the kingdom; but were expelled by Philip II. of Macedon.

PITHOM, one of the cities which the Israelites built for Pharaoh in Egypt (Exod. i. 11) during their servitude. This is probably the same city with Pathumos, mentioned by Herodotus, which he places upon the canal made by the kings Necho and Darius to join the Red Sea with the Nile, and consequently with the Mediterranean. There was an arm of the Nile called Pathmeticus, Phutmicus, Phatnicus, or Phatniticus. Bochart says that Pithom and Raamses are about five leagues above the division of the Nile, and beyond this river: but this assertion has no proof from antiquity. Marsham will have Pithom to be the same as Pelusium or Damietta.

PITHOU, or PITHOEUS (Peter), a Frenchman of great literary eminence, descended of an ancient and noble family in Normandy, and born at Troyes in 1539. He first studied at Troyes, and afterwards at Paris, where he became the scholar and friend of Turnebus. Having acquired the languages, he was placed under Cujacius at Bourges to study civil law, and accompanied him to Valence. In 1560 he returned to Paris. In 1563 he published Adversaria Subsèciva, which laid the foundation of that great and extensive fame he afterwards acquired. Soon after this Henry III. advanced him to some considerable posts; in which, as well as at the bar, he acquitted himself most honorably. He abjured the Protestant religion, and embraced the Catholic; and afterwards attended the duke of Montmorency into England. Pithoeus died upon his birth-day in 1596, leaving behind him a wife whom he had married in 1579, and some children. He collected a very valuable library, containing a variety of rare MSS., as well as printed books. He published a great number of works upon law, history, and classical literature; and he gave several new and correct editions of ancient writers. He was the first who made the world acquainted with the Fables of Phædrus; which, together with the name of their author, were utterly unknown and unheard of till published from a MS. of his.

PITHYUSÆ ISLES, a group of islands in the Mediterranean, belonging to the crown of Spain, of which the principal is Iviça. They have the coast of Spain to the north-west, Africa to the south, Sardinia to the east, and the Balearic Islands to the north-east. All these islands produce corn, oil, and wine, and good pasturage. Their exports consist in salt, and, in a smaller degree, in wool. The inhabitants are said to be extremely indolent. Their language is a strange jargon, and very few understand Spanish. The island next in size to Iviça is Formentera; the others are the Conejeras, Bosqua, Esparta (three small islands near the harbour of the town of Iviça), Grossa, St. Eulalia y de Arabi, Tacomago, &c.

PITIGLIANO, an inland town of the grand duchy of Tuscany, province of Sienna, with 2000 inhabitants. Fifty-four miles S. S. E. of Sienna.

PITISCUS (Samuel), a learned antiquary, born at Zutphen, was rector of the college of that city, and afterwards of St. Jerome at Utrecht, where he died February 1st, 1717, aged ninety. He wrote, 1. Lexicon Antiquitatum Romanorum, in 2 vols. folio, a work which is esteemed; 2. Editions of many Latin authors, with notes, and other works.

PIT'MAN, *n. s.* Pit and man. He that in sawing timber works below in the pit.

With the pitsaw they enter the one end of the stuff, the topman at the top, and the *pitman* under him; the topman observing to guide the saw exactly, and the *pitman* drawing it with all his strength perpendicularly down. *Moxon.*

PITOT (Henry), F. R. S., a learned writer, of a noble family in Languedoc, born at Aramont on the 29th of May, 1695. He acquired mathematics without a master, and went to Paris in 1718, where he formed a close friendship with the illustrious Reaumur. In 1724 he was admitted a member of the Royal Academy of Sciences at Paris, and in a few years rose to the degree of a pensioner. Besides a vast number of Memoirs, printed in the collection of that society, he published in 1731 The Theory of the Working of Ships, in 1 vol. 4to., a work of considerable merit, which was translated into English, and procured the author to be admitted into the Royal Society of London. In 1740 the states-general of Languedoc appointed him their chief engineer, and inspector-general of the canal. That country is indebted to him for several monuments of his genius, and he supplied Montpelier with water, by a noble aqueduct. The illustrious marshal de Saxe was the great patron and friend of Pitot, who had instructed this hero in the mathematics. In 1735 he married Maria-Leonina Pharambier de Sabbalona, descended of a very ancient noble family of Navarre, by whom he had one son, who was advocate-general of the court of accounts, aids, and finances of Montpelier. Pitot was also a member of the Royal Society of Sciences of Montpelier. He died at Aramont, 27th December, 1771, aged seventy-six.

PITS (John), a celebrated biographer, born in 1560 at Alton in Hampshire, and educated at Wykeham's school, near Winchester, till he was eighteen years of age, when he was sent to New College, Oxford, and admitted probationer fellow Having continued in that university nearly two years, he left the kingdom as a voluntary Romish exile, and retired to Douay; from thence he went to the English college at Rheims, where he remained about a year, and then proceeded to Rome, where he continued a member of the English college nearly seven years, and was made a priest. In 1589 he returned to Rheims; and there, during two years, taught rhetoric and Greek. He now quitted Rheims on account of

the civil war in France, and retired to Pont a Mousson in Lorraine, where he took the degrees of M. A. and B. D. Hence he travelled into Germany, and resided a year and a half at Triers, where he commenced licentiate. From Triers he visited several of the principal cities in Germany; and, continuing three years at Ingolstadt in Bavaria, took the degree of D. D. Thence, having made the tour of Italy, he returned once more to Lorraine, where he was patronised by the cardinal of that duchy, who preferred him to a canonry of Verdun; and about two years after he became confessor to the duchess of Cleves, daughter to the duke of Lorraine. While in this employment, he wrote in Latin the Lives of the Kings, Bishops, Apostolical Men, and Writers of England. The last of these, commonly known and quoted by this title, De illustribus Angliæ Scriptoribus, was published after his death. The three first still remain in MS. among the archives of the collegiate church of Liverdun. The duke of Cleves dying after Pits had been about twelve years confessor to the duchess, she returned to Lorraine, attended by our author, who was promoted to the deanery of Liverdun, which, with a canonry and officialship, he enjoyed to the end of his life. He died in 1616, and was buried in the collegiate church. He is accused of partiality to the Romish writers.

PIT'SAW, *n. s.* Pit and saw. The large saw used by two men, of whom one is in the pit.

The *pitsaw* is not only used by those workmen that saw timber and boards, but is also for small matters used by joiners. *Moxon.*

PITT (Christopher), an eminent English poet, celebrated for his translation of Virgil's Æneid, was born in 1699. Having studied four years at New College, Oxford, he was presented to the living of Pimperne in Dorsetshire, which he held during life. Next to his translation of Virgil, he gained the greatest reputation by his excellent English translation of Vida's Art of Poetry. He died in 1648.

PITT (Thomas), the founder of the Chatham family, was born at St. Mary, Blanford, Dorsetshire, in 1653, and towards the close of the century became governor of Madras, where he realised a large fortune. He was at this period the purchaser of a large diamond, afterwards called the Pitt diamond, for £20,400, which he sold to the king of France for more than five times that sum. A rumor prevailed for some time in England that he acquired it unfairly; and Pope is supposed to have alluded to this in the following couplet:—

Asleep and naked as an Indian lay,
An honest factor stole a gem away.

Mr. Pitt was therefore induced to compose a narrative of the manner in which he really became possessed of the diamond. He was made in 1716 governor of Jamaica, but did not hold that situation more than a year. He sat in four parliaments, for Old Sarum and Thirsk, and died in 1726. This gentleman was grandfather of the celebrated earl of Chatham.

PITT (William), earl of Chatham, a celebrated British statesman, was born in November 1708. He was the youngest son of Robert Pitt, esq., of Boconnock in Cornwall. His intellectual faculties and powers of elocution soon became apparent; but at the early age of sixteen he felt the attacks of an hereditary gout, by which he was tormented at times during the rest of his life. His lordship entered early into the army, and served in a regiment of dragoons. Through the interest of the duchess of Marlborough, he obtained a seat in parliament before he was twenty-one years of age. His first appearance in the house was as representative of the borough of Old Sarum, in the ninth parliament of Great Britain. In the tenth he represented Seaford, Aldborough in the eleventh, and the city of Bath in the twelfth; where he continued till he was called up to the house of peers in 1766. The intention of the duchess in bringing him thus early into parliament was to oppose Sir Robert Walpole, whom he kept in awe by the force of his eloquence. At her death the duchess left him £10,000, on condition, as was then reported, that he never should receive a place in administration. In 1746 he was appointed vice-treasurer of Ireland, and soon after paymaster-general of the forces, and a privy counsellor. He discharged the office of paymaster with such honor and inflexible integrity, refusing even many of the perquisites of his office, that his bitterest enemies could lay nothing to his charge, and he soon became the darling of the people. In 1755 he resigned office, on seeing Mr. Fox, afterwards lord Holland, preferred to him. The people were alarmed at this resignation; and, being disgusted with the unsuccessful beginning of the war, complained so loudly that, on the 4th of December 1756, Mr. Pitt was appointed secretary of state in the room of Mr. Fox, and other promotions were made to second his plans. He then took such measures as were necessary for the honor and interest of the nation; but in February 1757, having refused to assent to the carrying on a war in Germany for the sake of his majesty's dominions on the continent, he was deprived of the seals. Upon this the complaints of the people again became so violent that on the 29th of June he was once more appointed secretary, and his friends filled other important offices. The war was now conducted with uncommon success; until on the 5th of October, 1761, Mr. Pitt, to the astonishment of the public, again resigned. The immediate reason is now known to have been that having received intelligence of the family compact being signed between France and Spain, and that the latter was about to join France against us, he thought it necessary to prevent her by immediately commencing hostilities. Having communicated this opinion in the privy council, the other ministers urged that they would think twice before they declared war. 'I will not give them leave to think,' replied Mr. Pitt, 'this is the time to crush the whole house of Bourbon. But, if the members of this board are of a different opinion, this is the last time I shall ever mix in its councils.' He also felt himself generally thwarted under the new reign by the influence of the earl of Bute. After his resignation, in 1761, Mr. Pitt never had any share in administration. He received a pension of

£3000 a-year, to be continued after his decease, during the survivancy of his lady and son; and this gratuity was dignified with the title of baroness of Chatham to his lady, and that of baron to her heirs male. Mr. Pitt at that time declined a title of nobility; but in 1766 accepted of a peerage under the title of baron Pynsent and earl of Chatham, and at the same time was appointed lord privy seal. However, he continued stedfast in his opposition to the measures of administration. His last appearance in the house of lords was on the 2d of April, 1778. He was then so ill as to be supported to his seat by his brother-in-law lord Mahon and his son William; but the question was important, being a motion of the duke of Richmond to address his majesty to remove the ministers, and make peace with America on any terms. His lordship made a long speech, which had overcome his spirits; for, attempting to rise a second time, he fell down in a convulsive fit, and, though he recovered for a time, his disorder continued to increase till the 11th of May, when he died at his seat at Hayes. His death was lamented as a national loss. As soon as the news reached the house of commons, which was then sitting, colonel Barré made a motion, that an address should be presented to his majesty, requesting that the earl of Chatham should be buried at the public expense. But Mr. Rigby having proposed the erecting of a statue to his memory, as more likely to perpetuate the sense of his great merits entertained by the public, this was unanimously carried. A bill was soon after passed, by which £4000 a-year was settled upon John, the new earl of Chatham, and the heirs of the late earl to whom that title may descend.—His lordship was married in 1754 to lady H. Esther, sister to the earl of Temple; by whom he had three sons and two daughters. The manners of lord Chatham were easy and bland, his conversation spirited and gay, and he readily adapted himself to the complexion of those with whom he associated. He was unconstrained as artless infancy, and generous as the noon-day sun; yet had he something impenetrable that hung about him; and his unusual energy of soul made him often appear haughty and imperious. He was, indeed, incapable of associating in councils, and was not formed for the sweeter bands of society. He was a pleasing companion, but an unpliant friend. The eloquence of lord Chatham was one of his most striking characteristics. Here he far outstripped his competitors, and stood alone the rival of antiquity. But his spirit and intrepidity were conspicuous in every action of his life; nor did they leave him to the last. As an instance of his determined resolution, when he had any great national object in view, we shall conclude with a characteristic anecdote:—Preparatory to one of the secret expeditions, during the war which ended in 1763, the minister had given orders to the different presiding officers in the military, navy, and ordnance departments, to prepare a large body of forces, a certain number of ships, and a proportionable quantity of stores, &c., against a certain day. To these orders he received an answer from each of the officers, declaring the total impossibility of a compliance with them. Notwithstanding it was then at a very late hour, he sent immediately for his secretary, and, after expressing his resentment at the ignorance or negligence of his majesty's servants, he gave the following commands:—'I desire, Mr. Wood, that you will immediately go to lord Anson; you need not trouble yourself to search the admiralty, he is not to be found there; you must pursue him to the gaming-house, and tell him, from me, that if he does not obey the orders of government which he has received at my hands, I will most assuredly impeach him. Proceed from him to lord Ligonier; and, though he should be bolstered with harlots, undraw his curtains, and repeat the same message. Then direct your course to Sir Charles Frederick, and assure him that, if his majesty's orders are not obeyed, they shall be the last which he shall receive from me.' In consequence of these commands, Mr. Wood proceeded to White's, and told his errand to the first lord of the admiralty; who insisted that the secretary of state was out of his senses, and it was impossible to comply with his wishes; 'however (added he), as madmen must be answered, tell him that I will do my utmost to satisfy him.' From thence he went to the commander-in-chief of the forces, and delivered the same message. He also said that it was an impossible business; 'and the secretary knows it (added his lordship); nevertheless, he is in the right to make us do what we can; and what is possible to do, inform him shall be done.' The surveyor-general of the ordnance was next informed of Mr. Pitt's resolution; and, after some little consideration, he began to think that the orders might be completed within the time prescribed. The consequence at last was that every thing, in spite of *impossibilities*, was ready at the time appointed.

Pitt (the right honorable William), the second son of the illustrious statesman and patriot whose life and character we have sketched in the preceding article, was born at Hayes in Kent, on the 28th of May 1759, the memorable year in which the French dominion in North America was destroyed by the directing energy of his father, and the active heroism of general Wolfe. The earl of Chatham being driven from power at the beginning of the late reign, and disposed to private life by frequent ill health, bestowed much of his time and care on the education of his children. His eldest son was destined for the army, and another, James Charles, for the navy. The education of these he in a great measure confided to others. William he resolved to make a statesman; and in the formation of his character, and cultivation of his talents, was particularly assiduous. His hopes of success were at least equal to his care; for he was accustomed to say that his 'son William would one day increase the glory of the name of Pitt.' His classical education was conducted at Burton Pynsent, the family seat, by a private tutor, Dr. Wilson, afterwards a canon of Windsor; while his father took every means in his power, by personal instruction and conversation, to expand his mind and mature his judgment. He was particularly anxious to teach him, while yet very young, to speak with elegance and force, and to argue with

precision. He caused him, it is said, to declaim from a chair or a table, and engaged him in disputations on the most important subjects; pressing him with difficulties, that he might acquire a facility of overcoming opposition, and never allowing him to stop till each subject was exhausted, and every difficulty overcome. Thus he acquired two qualities of the utmost importance in public life; firmness and readiness, a quick and decisive perception, and a ready delivery.

At about fifteen years of age Mr. Pitt was sent to Cambridge, and admitted into Pembroke Hall, under the tuition of Dr. Turner, afterwards master of the college, and dean of Norwich. His private college tutor was the late Dr. Prettyman, afterwards bishop of Lincoln; to whose care and attention, in his mathematical and classical studies, he is said to have owed much. His conduct at Cambridge was highly exemplary. His rank as a nobleman's son entitled him to take the degree of M. A. tanquam nobilis, and therefore exempted him from the exercises and examinations to which those who first go out bachelors in that faculty are subjected. But, though he was thus deprived of the opportunity of displaying his talents in the contest for academical honors, his reputation in the university stood high, both for industry and conduct, and procured him an influence in that learned body of considerable importance in after life. Having left the university, Mr. Pitt was entered a student of Lincoln's Inn about the same time with Mr. Addington (afterwards lord Sidmouth), whose father was both the friend and physician of his family: and, on account of his degree, he was called to the bar in three years. He went the western circuit, we believe, twice, but had little practice, and acquired no celebrity as a lawyer.

His attention was now directed to that department of general politics for which his education had better fitted him. At the general election in 1780 he was advised to become a candidate for the university of Cambridge; but, high as his reputation then was, he had not yet sufficient influence to secure this great object. Early in the year 1781 he was, therefore, through the influence of the duke of Rutland, with Sir James Lowther, returned to parliament for the borough of Appleby in Cumberland, and his first appearance gave the highest promise of his future greatness. He took the side of opposition both on the subject of reform and of the American war, and eminently distinguished himself among the most illustrious speakers of that remarkable period. Into the various contests, discussions, and changes of this busy time, we mean not, in this place, to enter, and the rather as the reader, by referring to our history of ENGLAND, will find an account sufficiently copious, both of the public transactions and parliamentary motions and measures of the period. See also the life of Mr. Fox.

In December 1783 William Pitt, not yet twenty-four years of age, was called to fill the important office of prime minister of Great Britain, as first lord of the treasury, and chancellor of the exchequer. Such had been the vacillation of public parties, and the dissatisfaction with public measures for some time previous, that this, with the other appointments connected with it, was approved by the nation with every expression of joy. The coalition ministry, which Mr. Pitt and his friends displaced, was particularly obnoxious to the nation, but it still retained a majority in the house of commons; and, though gradually declining in strength, made many efforts to displace the new ministry. These would, probably, in most other circumstances, have been successful; but the youthful premier, supported by the king, the house of peers, and a large majority of the nation, stood undaunted before the formidable opposition in the lower house, and declared himself, with a firmness equally surprising and characteristic, the minister of the crown, which possessed uncontrolled power to nominate its own servants. He found himself, however, obliged either to dissolve the parliament, or to form some accommodation with his opponents. The latter expedient he attempted without success, and therefore suddenly adopted the former, on the 25th of March 1784. He was now returned by the university of Cambridge, and found himself, on the meeting of the new parliament, possessed of a triumphant majority in both houses, and supported by as general an expression of national approbation as was ever, in any circumstances, conferred on any minister.

Having attained, at so early an age, the summit of power and influence, Mr. Pitt exercised his authority with a decision and firmness which have been as much the object of the opprobrium of one party as of the hearty applause and approbation of another. Into any particular detail of his long political power we mean not to enter in this place; the articles already referred to render such detail unnecessary. The period in which he exercised his high office is singularly important, and will be long remarkable in the history of the world; and in that general history Mr. Pitt will hold a distinguished place, whether it be written by friend or foe. He was censured by the opposition and his enemies for a total desertion of his former principles on his accession to power—those principles which cast a special glory round his father's name, and by which he himself, while in opposition, had courted popularity and attained power. The future historian of this great man's life, however, will attribute a just portion of the supposed inconsistency to the enthusiasm of youth and the habit of opposition on the one hand, and on the other to that change of sentiment and system which the actual possession of power must inevitably produce. For every man in similar circumstances will quickly find that that which often appears most beautiful and perfect in theory, is not always easy, nor often possible in practice. We mean not to call in question the advantages which are supposed to result from an opposition in a free country; but evils are inevitable in every human system, and some sufficiently notorious seem to attach to the system of party opposition in this country, and to be attributable to some of the greatest men, when in opposition.

It does not, therefore, appear to us, we confess,

necessarily to follow, that the measures of a minister are wrong, and his character vicious and inconsistent, because they differ materially from his language in opposition; and we are perfectly certain that the grounds on which we would venture to palliate the supposed political delinquences of Mr. Pitt, cannot safely be rejected by his political enemies, without exposing themselves and their leaders to at least equal censure. The period in which, as prime minister, he stood at the head of the public counsels, was beyond all precedent difficult and dangerous, and he might without much censure, even in the first stages of his administration, hesitate about carrying into effect those theories of reform which, in his early enthusiasm, he so eloquently supported. Those difficulties which he would then be the last to anticipate, he would now be the first to feel; and the rapid events of his momentous life quickly pressed them on his attention with a force not to be resisted. That he was ambitious of power is not denied by his friends; but, even if he erred in the exercise of his power, it seems now to be admitted, even by his enemies, that he aimed to promote the honor and the interest of his country. He has never been accused of any private vice: and, while he retrieved the finances of the country from approaching ruin, and by his management and measures enabled the country to make exertions beyond the utmost reach of previous calculation, he himself lived in comparative poverty, and died in debt.

After holding his high office for the long period of eighteen years, Mr. Pitt and all the members of his cabinet suddenly retired in 1801. The cause of his retreat from office was said to be a promise to the Catholics connected with the union of Ireland which he could not fulfil. The real cause, we are persuaded, was the necessity, real or supposed, of making peace. Mr. Addington became prime minister, and preliminaries were signed at London on the 1st of October, 1801. The definitive treaty was signed at Amiens in March 1802, see England, and was defended by Mr. Pitt in the house of commons with all the force of his abilities and influence. Comparing his conduct now with that in January 1800 we must confess that we think it inconsistent; but perhaps it was necessary to *prove*, to general conviction, how vain was the hope of permanent tranquillity with such a power as that of France; and this advantage the hollow truce which endured little more than a year, we believe, effectually produced.

In 1804 Mr. Pitt opposed the administration which he had hitherto generally supported; and, after various contests, Mr. Addington retired, and he resumed his former situation; not without being violently accused of deceiving Mr. Fox, by whose influence he succeeded in lessening the minister's majority. He did not long survive his reinstatement in office; his constitution was not strong, and he was subject to an hereditary gout, which he is said to have increased by his too free use of port wine. In 1805 he succeeded in forming a new coalition against France, between Great Britain, Russia, and Austria, the effects of which were singularly fatal; the humiliation of Austria being completely sealed by the disastrous battle of Austerlitz in the close of that year. His end was now rapidly approaching; but it was probably hastened by the news of that disaster, and by the desolating prospect which the civilised world exhibited to his ardent but debilitated mind. He died in a Christian manner on the 23rd of January, 1806, in the forty-seventh year of his age. Among the last words which he was heard to utter were, 'Oh, my country!' Mr. Pitt was interred at the public expense, and a monument was ordered in Westminster Abbey to his memory. On the 3rd of February, 1806, £40,000 sterling were voted to defray his debts, which both friends and enemies allowed were contracted neither by profusion nor excess. His great political opponent, however, opposed this motion. The public funeral took place on the 22nd of February. The principal herald proclaimed the style of the deceased: The late right honorable William Pitt, one of his majesty's most honorable privy council, first lord commissioner of the treasury, admiral and lord warden of the Cinque Ports, and governor of Dover Castle; one of the representatives in parliament for the university of Cambridge, and high steward for that university; one of the lords of trade and plantation; a commissioner for the affairs of India; and the character to whose memory is inscribed—Non sibi sed patriæ vixit!'

Pitt, a county of the east part of North Carolina. Population 9169. Chief town Greenville.

PITTACUS, a native of Mitylene in Lesbos, was one of the seven wise men of Greece; his father's name was Hyrradius. With the assistance of the sons of Alcæus he delivered his country from the oppression of the tyrant Melanchrus; and, in the war which the Athenians waged against Lesbos, he appeared at the head of his countrymen, and challenged to single combat Phrynon the enemy's general. As the event of the war seemed to depend upon this combat, Pittacus had recourse to artifice; and when he engaged he entangled his adversary in a net which he had concealed under his shield, and easily despatched him. He was amply rewarded for this victory, and his countrymen unanimously appointed him governor of their city with unlimited authority. In this capacity Pittacus behaved with great moderation and prudence; and, after he had governed his fellow-citizens with the strictest justice, and established the most salutary laws, he voluntarily resigned the sovereign power, having enjoyed it for ten years. His disinterestedness gained him many admirers; and, when the Mityleneans wished to reward his public services by presenting him with an immense tract of territory, he refused to accept more land than what should be contained in the distance to which he could throw a javelin. He died in his seventieth year, about A. A. C. 579, after he had spent the last ten years of his life in literary ease and retirement. Many of his maxims were inscribed on the walls of Apollo's temple at Delphi, to show to the world how great an opinion the Mityleneans entertained of his abilities as a philosopher and a moralist.

PITTANCE, *n. s.* Fr. *pitance*; Ital. *pittanza*; Span. *pitania*; of low Lat. *pitacium*. An al-

lowance of meat in small portions; any small portion.

Then at my lodging,
The worst is this, that at so slender warning
You're like to have a thin and slender *pittance*.
Shakspeare.

The ass saved a miserable *pittance* for himself.
L'Estrange.

I have a small *pittance* left, with which I might retire.
Arbuthnot.

Many of them lose the greatest part of the small *pittance* of learning they received at the university.
Swift's Miscellanies.

Half his earned *pittance* to poor neighbours went;
They had his alms, and he had his content. *Harte.*

Though duly from my hand he took
His *pittance* every night,
He did it with a jealous look,
And, when he could, would bite.
Cowper.

A terrier, too, which once had been a Briton's,
Who dying on the coast of Ithaca,
The peasants gave the poor dumb thing a *pittance*.
Byron.

PITTHEUS, the son of Pelops and Hippodamia, king of Trœzene. He educated not only his grandson Theseus, the son of Ægeus king of Athens by his daughter Æthra, but also many of his subjects; and wrote a work, which was extant in the time of Pausanias the geographer. He was buried at Trœzene, where his tomb and seat of judgment were seen many ages after. Paus. 1 and 2. Plut. Strabo, 8.

PITTOSPORUM, in botany, a genus of the monogynia order, and pentandria class of plants: CAL. pentaphyllous, inferior, and deciduous: petals five: the style thread-shaped: CAPS. somewhat angular, trilocular, and containing three or four angulated seeds, adhering to the capsule by means of a liquid resin to the loculaments. Of this there are three species, viz.

1. P. coriaceum grows in Madeira, and flowers in May and June.

2. P. tenuifolium, and—3. P. umbellatum, are both natives of the Cape of Good Hope.

PITTSBOROUGH, a post town and capital of Chatham county, North Carolina, thirty miles south-west of Raleigh, and fifty-four N. N. W. of Fayetteville. It is situated on an eminence, in a very fertile and well cultivated country, and contains a court-house, jail, and academy.

PITTSBURG, a city of the United States, and capital of Alleghany county, Pennsylvania, 230 miles N. N. W. of Baltimore, and 297 west by north of Philadelphia. It is situated on a beautiful plain, on a broad point of land, where the confluence of the Alleghany and Monongahela forms the Ohio. This place was once in the hands of the French, and then called Fort du Quesne, afterwards Fort Pitt, and was commenced as a town under the name of Pittsburg in 1760. It is a very flourishing manufacturing and commercial town, and has an extensive trade. It contains a court-house, a jail, a national armoury and magazine, an academy, a library of about 2000 volumes, four banks including a branch of the United States bank, and eight houses of public worship. The plat of ground on which the town is built i. nearly in the form of a triangle, and is now almost filled with houses. A suburb has been laid out on the Alleghany, called the northern liberties, and another on the Monongahela. There are four other villages which are virtually suburbs of Pittsburg, Birmingham on the left bank of the Monongahela; Alleghany upon the second bank of Alleghany River, opposite the city; Lawrenceville, two miles above Pittsburg on the Alleghany; and a street running along the left bank of the Monongahela opposite Pittsburg. The number of dwelling houses in the city, in 1816, was stated at 960, and in the suburbs and villages in the vicinity 300, making in the whole 1260, and the total population estimated at 12,000.

Pittsburg is a place of great domestic and foreign commerce. The waggons that have passed to and from the town, counted at the nearest turnpike gate, have amounted in one year to 11,800. The surrounding country is one great bed of fossil coal, and the hills in sight of the town are full of that mineral. The region also abounds in iron ore, and various mineral and vegetable productions. In 1816 there were in this town and its connected vicinity eight steam mills, five green and white glass houses, in which every kind of glass, from a porter bottle or window glass to very elegant cut crystal glass, is manufactured; four air furnaces; three breweries, in which are made immense quantities of beer, porter, and ale; sixty-seven flour mills, and numerous other mills and manufactories. With regard to manufactures Pittsburg is the first town in the western country, and with regard to population and trade it is second only to New Orleans.

Travellers are almost always disappointed on entering this city; there is but one point of approach which affords a good view of the place; that is the summit of a hill in the road from Washington. Except from the gratifying reflection excited by the appearance of so much industry, Pittsburg is by no means a pleasant place to a stranger. The constant volumes of smoke fill the atmosphere with coal dust. In October 1815 it was calculated that 2000 bushels of coal were consumed daily on a space of two miles and a half square. Three newspapers are published here. Vessels of 200 or 300 tons at some seasons descend the Ohio from Pittsburg; the distance from this place to New Orleans by the course of the rivers is about 2000 miles.

PITTSFIELD, a post town of Berkshire county, Massachusetts, six miles north of Lenox, thirty-six E. S. E. of Albany, and 136 west of Boston. It is watered by the Housatonic, and is a very pleasant, handsome, and flourishing town. It contains three houses of public worship, two for Congregationalists and one for Methodists, a bank, a town-house, a female academy, a printing office from which is issued a weekly newspaper, three woollen manufactories, a marble manufactory, a manufactory of small arms, &c. Large numbers of chaises, coaches, and waggons are made here. Good marble is found in this and several of the neighbouring towns. The United States have barracks here sufficient to accommodate 2000 men, and a hospital. Pittsfield is situated in a very fertile tract of country, and is one of the best agricultural

towns in the state. A cattle show is held in this town annually about the 1st of October.

PITTSYLVANIA, a county of the United States, on the south side of Virginia, bounded north by Bedford and Campbell counties, east by Halifax county, south by North Carolina, and west by Henry and Franklin counties. Chief town Danville.

PIT'UITE, *n. s.* } PITU'ITOUS, *adj.* } Fr. *pituite;* Lat. *pituita.* Phlegm; consisting of phlegm.

It is thus with women only that abound with *pituitous* and watery humours. *Browne's Vulgar Errours.*

The lungs are formed, not only to admit, by turns, the vital air by inspiration, and excluding it by respiration; but likewise to separate and discharge the redundant *pituitous* or flegmatick parts of the blood. *Blackmore.*

The forerunners of an apoplexy are weakness, wateriness, and turgidity of the eyes, *pituitous* vomiting and laborious breathing. *Arbuthnot on Diet.*

Serous defluxions and redundant *pituite* were the product of the winter, which made women subject to abortions. *Arbuthnot.*

PITUITARY GLAND. See ANATOMY.

PIT'Y, *n. s.* & *v. a.*
PIT'EOUS, *adj.*
PIT'EOUSLY, *adv.*
PIT'EOUSNESS, *n. s.*
PIT'IABLE, *adj.*
PIT'IABLENESS, *n. s.*
PIT'IFUL, *adj.*
PIT'IFULLY, *adv.*
PIT'IFULNESS, *n. s*
PIT'ILESS, *adj.*

Fr. *pitie;* Ital. *pieta;* Lat. *pietas.* Compassion; tender or pious sympathy; ground of regret or grief; used sometimes in this last sense in the plural, see the extract from L'Estrange: to compassionate misery or distress; regard with sympathy; be compassionate: piteous is, sorrowful; mournful; exciting to pity: tender; compassionate; also mean, paltry, wretched; piteously and piteousness follow these senses. Pitiable means deserving compassion: pitiableness, state of deserving pity: pitiful, sorrowful; melancholy; tender; mean; despicable: pitifully and pitifulness corresponding: pitiless is, destitute of pity or compassion; merciless.

I will not *pity* nor spare, nor have mercy, but destroy them. *Jeremiah* xiii. 14.

He made them to be *pitied* of all.
Psalm cvi. 46.

Pitifully behold the sorrows of our hearts.
Common Prayer.

Will he his *pitiful* complaints renew?
For freedom with afflicted language sue? *Sandys.*

Basilius giving the infinite terms of praises to Zelmane's valour in conquering, and *pitifulness* in pardoning, commanded no more words to be made of it. *Sidney.*

Some, who have not deserved judgment of death, have been for their goods' sake caught up and carried straight to the bough; a thing indeed very *pitiful* and horrible. *Spenser.*

When they heard that *piteous* strained voice,
In haste forsook their rural merriment. *Id.*

Fair be ye sure, but proud and *pitiless,*
As is a storm, that all things doth prostrate,
Finding a tree alone all comfortless,
Beats on it strongly, it to ruinate. *Id.*

That he is old, the more is the *pity,* his white hairs do witness it. *Shakspeare. Henry IV.*

When I desired their leave that I might *pity* him, they took from me the use of mine own house.
Shakspeare.

A sight most *pitiful* in the meanest wretch,
Past speaking of in a king. *Id. King Lear.*

Be *pitiful* to my condemned sons,
Whose souls are not corrupted. *Shakspeare.*

That's villainous, and shews a most *pitiful* ambition in the fool that uses it. *Id. Hamlet.*

He beat him most *pitifully;* nay,
He beat him most unpitifully. *Shakspeare.*

The most arch deed of *piteous* massacre,
That ever yet this land was guilty of. *Id.*

I must talk of murthers, rapes, and massacrees,
Ruthful to hear, yet *piteously* performed. *Id.*

Hadst thou in person ne'er offended me,
Even for his sake am I now *pitiless.* *Id.*

Julius Cæsar writ a collection of apophthegms; it is *pity* his book is lost. *Bacon.*

My chance, I see,
Hath made even *pity pitiless* in thee.
Fairfax.

One, in a wild pamphlet, besides other *pitiful* malignities, would scarce allow him to be a gentleman. *Wotton.*

You I could *pity* thus forlorn. *Milton.*

Piteous amends! unless
Be meant our grand foe. *Id. Paradise Lost.*

Wan and meagre let it look,
With a *pity*-moving shape. *Waller.*

Some of the philosophers doubt whether there were any such thing as sense of pain: and yet, when any great evil has been upon them, they would sigh and groan as *pitifully* as other men. *Tillotson.*

For the *pitiableness* of his ignorance and unwilled mistake, so long as they lasted, his neglect thereof may be excused and connived at. *Kettlewell.*

'Tis great *pity* we do not yet see the history of Chasmir. *Temple.*

The mournful train,
With groans and hands upheld, to move his mind,
Besought his *pity* to their helpless kind. *Dryden.*

See, where she comes, with that high air and mien,
Which marks in bonds the greatness of a queen;
What *pity* [illegible] *Id.*

Which when Deucalion with a *piteous* look
Beheld, he wept. *Id.*

What entertainment can be raised from so *pitiful* a machine, where we see the success of the battle from the beginning? *Id.*

Upon my livid lips bestow a kiss,
Nor fear your kisses can restore my breath;
Even you are not more *pitiless* than death. *Id.*

An ant dropt into the water; a woodpigeon took *pity* of her, and threw her a little bough.
L'Estrange.

Singleness of heart being a virtue so necessary, 'tis a thousand *pities* it should be discountenanced.
Id.

If these *pitiful* shanks were answerable to this branching head, I should defy all my enemies. *Id.*

The conveniency of this will appear, if we consider what a *pitiful* condition we had been in. *Ray.*

Sin can please no longer, than for that *pitiful* space of time while it is committing; and surely the present pleasure of a sinful act is a poor countervail for the bitterness which begins where the action ends and lasts for ever. *South.*

Who would not be that youth? what *pity* is it,
That we can die but once to serve our country!
Addison.

Compassionate my pains! she *pities* me!
To one that asks the warm return of love,
Compassion's cruelty, 'tis scorn, 'tis death. *Id.*

If the series of thy joys
Permit one thought less cheerful to arise,
Piteous transfer it to the mournful swain
Prior.

The *pitiable* persons relieved are constantly under your eye. *Atterbury.*

Lest the poor should seem to be wholly disregarded by their maker, he hath implanted in men a quick and tender sense of *pity* and compassion. *Calamy.*

She gave him, *piteous* of his case,
A shaggy tapestry. *Pope's Dunciad.*

Those men who give themselves airs of bravery on reflecting upon the last scenes of others, may behave the most *pitifully* in their own. *Clarissa.*

Pity weakness and ignorance, bear with the dulness of understandings, or perverseness of tempers. *Law.*

The man is to be *pitied*, who in matters of moment has to do with a staunch metaphysician; doubts, disputes, and conjectures will be the plague of his life. *Beattie.*

Oh then I read thy loss—Thy heart is sunk
In the dark waters *pitiless*; some dear friend,
Or brother, loved as thine own soul, lies there—
I *pity* thee, sad man, but can no more—
Gold I can give, but can no comfort give;
For I am comfortless. *Maturin.*

PITYOCAMPASIS, in entomology, a name often given to the caterpillar of the pine-tree. It is the bombyx pityocampa of Fabricius, and greatly resembles the processionary caterpillar of the oak. The ancients used it as a vesicatory, and the acrimony seems to reside chiefly in a dust which is concealed in receptacles on its back. This is its offensive weapon, for it is thrown out at will, and produces very troublesome effects, though the hair of the animal and every part of its body seem to have a similar, but weaker power. The effect is also weaker in winter. Their silk is not sufficiently strong for the loom, and in hot water melts almost to a paste. In the earth it forms nests of stronger silk, but it is then found with difficulty: in boxes its silk is extremely tender; and handling the cone produces all the bad effects of the dust.

PIV'OT, *n. s.* Fr. *pivot.* A pin on which any thing turns.

When a man dances on the rope, the body is a weight balanced on its feet, as upon two *pivots.* *Dryden's Dufresnoy.*

PIVOT, a foot or shoe of iron or other metal, usually conical or terminating in a point, whereby a body, intended to turn round, bears on another fixed at rest, and performs its revolutions. The pivot usually bears or turns round in a sole, or piece of iron or brass hollowed to receive it.

PIURA, a province of Peru, bounded north-east by Loxa, east by Jaen de Bracamoros, south-east by the district of Huambos, west by the Pacific, and north-west by the Bay of Guayaquil. It is sixty-six leagues from north to south, and fourteen wide; and abounds in maize, cotton, and sugar, French beans, melons, quinces, and other fruits.

PIURA, the capital of the province of this name was the first Spanish settlement in Peru, and founded in 1531, by Pizarro. It then stood in the valley of Targasala, nearer the sea, and was called San Miguel de Piura, but the inhabitants removed, on account of the unhealthiness of the situation, to its present site. The houses are of brick, cane, or wood-work, and have generally only one story. The corregidor, and a revenue officer reside here and at Pavia alternately. It has an hospital and church. Inhabitants 7000. Twenty-five miles S. S. E. of Payta. The climate is hot and dry, but not unwholesome.

PIUS, a name assumed by seven popes of Rome, of whom the most celebrated are the following:—

PIUS II. (Æneas Sylvius Piccolomini), was born on the 18th of October 1405, at Corsigni, in Siennese. Æneas was carefully educated, and, having finished his studies at Sienna, he went in 1431 to the council of Basle with cardinal Capranica, as his secretary. He afterwards acted in the same capacity to cardinal Albergati, and to Frederick III., who decreed to him the poetic crown, and sent him ambassador to Rome, Milan, Naples, and Bohemia. Nicolas V. advanced him to the bishopric of Trieste, and after to that of Sienna. In 1456, after having distinguished himself in various nunciatures, he was made a cardinal by Calixtus III., whom he succeeded as pope on the 27th of August 1458. Pius II., from the commencement of his pontificate, appeared jealous of any innovations on the papal prerogatives. In 1460 he declared a bull, 'declaring appeals from the pope to a council to be null, erroneous, detestable, and contrary to the sacred canons.' That bull, however, did not prevent the procurator general of the parliament of Paris from appealing to a council in defence of the Pragmatic sanction, which the pope had strenuously opposed. Pius was then at Mantua, whither he had gone to engage the Catholic princes in a war against the Turks. The greater part of them agreed to furnish either troops or money; others refused both, particularly the French. He at length persuaded Louis XI. to abolish the Pragmatic sanction, which the parliament of Paris had supported with so much vigor. The year 1462 was rendered famous by a controversy which took place between the Cordeliers and Dominicans, in which the dispute became so violent that they styled each other heretics; which obliged the pope to issue a bull, fordidding such odious epithets. He next published another bull, dated 26th of April, retracting what he had written to the council of Basle when he was its secretary; wherein he had expressed some sentiments that 'tended to diminish the authority of the apostolic see.' In this bull he gave a short account of his life and actions, with the history of the council of Basle, to which he went with cardinal Capranica in 1431. In the mean time, the Turks were threatening Christendom. Pius, ever zealous against the infidels, resolved to fit out a fleet, and pass over into Asia himself. He went to Ancona, but fell sick with the fatigue of the journey, and died on the 16th of August 1464, aged fifty-nine. Pius II. was one of the most learned men of his time, and one of the most zealous pontiffs. His chief works are, 1. Memoirs of the Council of Basle. 2. The History of the Bohemians, from their origin to 1458. 3. Two books on Cosmography. 4. The History of Frederic III., published in 1785, folio. 5. A Treatise on the Education of Children. 6. A poem upon the Passion of Jesus Christ. 7. A Collection of 432 letters, printed

at Milan 1473, in folio, in which are some curious anecdotes. 8. Memoirs of his own Life, published by John Gobellin Personne, his secretary, at Rome, 4to., 1584. 9. Historia rerum ubicumque gestarum, of which only the first part was published at Venice in 1477, in folio. His works were printed at Helmstadt in 1700, in folio, with his life prefixed.

Pius IV. (John Angelo De Medicis), but not of the Florence family, was born at Milan in 1499. He was son to Bernardin Medecini, and brother of the famous marquis de Marignan general to Charles V. He filled several important offices under popes Clement VII. and Paul III. Julius III., who had entrusted him with several legations, made him a cardinal in 1549; and he was elected pope on the death of Paul IV., December 25th 1559. His predecessor had rendered himself detestable to the Romans, and Pius IV. commenced his reign by punishing his nephews, causing cardinal Carasse to be strangled, and his brother, prince Palliano, to be beheaded. His zeal was afterwards directed against the Turks and Protestants. To stop the progress of these last, he renewed the council of Trent. In 1561 he sent to all the Catholic and Protestant princes the bull for calling that assembly. An end was, however, put to it by the industry of his nephew, S. Charles Barromeus, in 1563; and, on the 26th of January 1564, he confirmed its decrees. In 1565 a conspiracy was formed against his life by Benedict Acolti, and other visionaries; but was discovered, and Benedict put to death. Pius died December 9th 1565, aged sixty-six, much hated by the Romans, whom his severities had exasperated. He adorned Rome with several public edifices.

Pius V. (S. Michael Ghisleri), born at Bosco, on the 17th of January 1504, was the son of a senator of Milan. He became a Dominican friar. Paul IV. made him successively bishop of Sutri, cardinal, and inquisitor-general in Lombardy: but the severity with which he exercised his office obliged him to quit that country. He was sent to Venice, where his zeal met with still greater obstacles. Pius IV. made him bishop of Mondovi; and on his death he was elected pope, in 1566. His first object was to repress the luxury of the clergy, the pride of the cardinals, and the licentious manners of the Romans. He caused the decrees of Reformation enacted by the council of Trent to be put in execution; he prohibited bull-baiting in the Circus; he expelled prostitutes from Rome; and allowed cardinals to be prosecuted for debt. He was, however, a great persecutor of the Protestants, and several perished in the flames of the inquisition. He particularly displayed his zeal for the grandeur of the Holy See in 1568, by ordaining that the bull In cæna Domini, which Clement XIV. had suppressed, should be published throughout the whole church. That bull establishes the unlimited power of the popes over all princes, and was rejected by most of the foreign states. Pius V. had the courage to make war on the Turks, forming a league with the Venetians and Philip II. of Spain. This was the first time that the standard of the two keys was seen displayed against the crescent. The naval armies engaged on the 7th of October 1571, in Lepanto Bay, and the Christian princes obtained a signal victory over the Turks, who lost above 30,000 men, and near 200 galleys. The success was chiefly owing to the pope, who exhausted his treasury in fitting out that armament. He died of the gravel six months after, 30th April 1572, aged sixty-eight. His name will for ever adorn the list of Roman pontiffs. His bulls in favor of the inquisition, with his rigorous prosecution of heretics, prove that he had more zeal than humanity; but, in other respects, he was not without his virtues. Selim II. caused public rejoicings to be made at Constantinople for his death for three days. The pontificate of Pius is also celebrated for the condemnation of Baius, the extinction of the order of Humiliati, and the reformation of that of the Cistercians. He was canonised by Clement XI. in 1712. There are extant several of his letters, printed at Anvers, in 1640, in 4to. Felibian, in 1672, published his life, translated from the Italian of Agatio di Somma.

Pius VI., whose original name was Angelo Braschi, was of a noble, but reduced family. He was born in 1718, and rose to the rank of prelate and cardinal entirely by his merit. He was elected pope on the death of Clement XIV. During the first years of his pontificate, which were perfectly tranquil, he succeeded in draining a considerable portion of the Pontine marshes, not only employing the best engineers, but regularly inspecting the work himself. Along the banks of the canals, which were ornamented with four rows of poplars, he made a road near forty miles long, in a straight line, terminating with an elegant palace. His tranquillity was at last interrupted on the accession of the emperor Joseph II., whose plans of reformation prognosticated no increase of authority to the church. To prevent their execution, Pius made a visit personally to the emperor, in January 1782, who received him with all possible respect, but adhered inflexibly to his purpose. The revolution in France, and the consequent overthrow of all forms of religion there, gave him a still greater shock. Pius, however, did his utmost to preserve peace with the republic, but the murder of citizen Basseville, the French ambassador, in 1793, furnished the Directory with a pretext to overthrow the papal power, and carry the pope a prisoner to France; where, after being shifted about to various places, he died at Valence in August 1799, and received a burial far inferior to his dignity.

Pius VII. (pope), whose family name was Barnabus Chiaramonte, was born at Cevena, August 14th, 1740. He was raised to the purple in 1785, and held the bishopric of Imola, where he was visited by Buonaparte, in 1796. Having conciliated the favor of this important guest, he was, through his influence, promoted to the papacy, in March, 1800, and on the 15th of July 1801 signed the concordat between the Holy See and the Gallican church. He went to Paris in 1804, to assist at the coronation of the emperor; and afterwards refused to confer a similar favor on Louis XVIII. By a decree of the 17th of May, 1809, Napoleon put an end to the temporal power of the pope, uniting his ter-

ritories to the French empire; and Pius himself was detained as a prisoner at Fontainebleau, till the overthrow of Buonaparte, when he returned to Rome, and died there August 20th, 1823.

PIX, *n. s.* Lat. *pixis.* A little chest or box, in which the Romish consecrated host is kept.

He hath stolen a *pix*, and hanged must a' be.
Shakspeare.

Pix, trial of the, in British coinage, a curious and ancient mode of examining the correctness of gold and silver coins. It is thus described in substance, in the Archæologia, by the very able Mr. Ruding, author of Annals of the Coinage. Having stated that the earliest notice of the pix which he has met with in any modern foreign mint, is in the reign of Philip VI. of France in the fourteenth century; it cannot, he adds, be determined whether the passage in which it occurs relates to a public trial.

But the invention of it in this kingdom, or at least its introduction into our courts, is probably of high antiquity; for in the 9th or 10th of Edward I. it is mentioned as a mode well known, and of common usage. In one of those years the king, by his writ, commanded the barons of the exchequer to take with them Gregory de Rokesle (then master of the mint), and straightway, before they retired from the exchequer, to open the boxes of the assay of London and Canterbury, and to make the assay, 'in such manner as the king's council were wont to do,' and to take an account thereof, so that they might be able to certify the king touching the same, whenever he should please.

From this record, which is the most ancient hitherto discovered relating to this trial, it appears, says our author, that, previous to the above date, it had usually been made before the king's council, but that, by the authority of the writ above quoted, it was then to be held in the court of exchequer, in the presence of the barons. It was afterwards taken from their cognizance, and came again under the power of the lords of the council in the Star chamber, where it is found to have been in the year 1595 (as appears from a verdict of that date), and where it continued until 1699, when it again became subject to the court of exchequer; under which it has remained to the present time. From memoranda of assays, which are still preserved in that court, it seems that this trial used to be annually; and the same is stated to have been the regular practice until the usurpation, when it was held at such times as the state pleased. At present, I believe, it is not customary for the master to require it to be held until, upon his removal from the office, it becomes necessary, in order that he may receive his quietus. As the authority under which these trials are held occasionally varied, so did likewise the persons who sat as judges in the court. Thus, as we have seen above, they were first the members of the king's council, then the barons of the exchequer, and again the members of the privy council, as judges of the star chamber, where sometimes the king himself presided; as did James I. at an assay which was made upon the 9th of May 1611.

In 1643 a committee of lords and commons was appointed, by order of parliament, for the purpose of making this trial. At one period (in 1649), the court was held before the lord president of the council of state, the commissioners of the great seal, and others of the council of state, and committee of revenue, by virtue of an act of parliament: at another (in 1657) by the lords commissicners of the great seal, assisted by the lords commissioners of the treasury, the justices of the several benches, and barons of the exchequer, or some of them, under the authority of a warrant signed by the protector Cromwell; and it is now composed of such members of the privy council as are expressly summoned for that purpose; the lord high chancellor, or, in his absence, the chancellor of the exchequer presiding.

The manner in which this trial was formerly conducted in the court of exchequer appears, from a verdict of the 11th year of Henry VI., to have been by an assay, made in the presence of the court, and of other persons who were appointed to assist, by the king's assay master, and to have been determined without the intervention of a jury. The earliest notice which has occured in which the judgment of professional artists was required to sanction, as a jury, the judgment of the court, is dated in the 37th of Elizabeth; when a trial was held in the star chamber. The number of the jurors has occasionally varied considerably. No less than nineteen names appear to the verdict of the 37th of Elizabeth; and in 1651 the moneyers speak of a jury of twenty-four men: whilst the number usual at the present time is no more than twelve.

'As I have not been able to discover any ancient ceremonial by which the forms of this trial were regulated, I must now proceed,' Mr. R. continues, 'to state the modern practice of summoning the court, and conducting the business of it. Upon a memorial being presented by the master of the mint, praying for a trial of the pix, the chancellor of the exchequer moves his majesty in council, to that purpose. A summons is then issued to certain members of the privy council, to meet at the house, which is now allotted to the office of receiver of the fees in his majesty's exchequer, at eleven o'clock in the forenoon, on a certain day. A precept is likewise directed by the lord high chancellor to the wardens of the Goldsmiths' Company, requiring them to nominate, and set down, the names of a competent number of sufficient and able freemen of their company, skilful to judge of, and to present the defaults of the coins, if any should be found, to be of the jury, to attend at the same time and place. This number is usually twenty-five, of which the assay master of the company is always one.

'When the court is formed, the clerk of the goldsmiths' company returns the precept, together with the list of names; the jury is called over, and twelve persons are sworn. The president then gives his charge, which was formerly to be general, like the oath, to examine by fire, by water, by touch, or by weight, or by all, or by some of them, in the most just manner, whether the monies were made according to the indenture, and standard trial pieces, and within the remedies. But, in 1754, the lord high chan-

cellor Talbot directed the jury to express precisely how much the money was within the remedies, and the practice which he thus enjoined is still continued. The other parts of the charge necessarily vary, according to the ability of the president, and his knowledge of the subject. When it is concluded, the pix is delivered to the jury, and the court is commonly adjourned to the house of the president, where the verdict is afterwards delivered.

'The jury then retire to the court room of the duchy of Lancaster, whither the pix is removed, together with the weights of the exchequer and mint, and where the scales which are used upon this occasion are suspended, the beam of which is so delicate that it will turn with six grains, when loaded with the whole of those weights, to the amount of 48 lb. 8 oz. in each scale. The jury being seated, the indenture, or the warrant under which the master has acted, is read. Then the pix is opened, and the money which had been taken out of each delivery, and enclosed in a paper parcel, under the seals of the warden, master, and comptroller of the mint, is given into the hands of the foreman, who reads aloud the indorsement, and compares it with the account which lies before him. He then delivers the parcel to one of the jury, who opens it, and examines whether the contents agree with the indorsement.

'When all the parcels have been opened, and found to be right, the monies contained in them are mixed together in wooden bowls, and afterwards weighed. Out of the said monies so mingled, the jury take a certain number of each species of coin, to the amount of one pound weight, for the assay by fire; and the indented trial pieces of gold and silver, of the dates specified in the indenture, being produced by the proper officer, a sufficient quantity is cut from either of them, for the purpose of comparing with it the pound weight of gold or silver which is to be tried (after it has been previously melted and prepared) by the usual methods of assay. When that operation is finished, the jury return their verdict, wherein they state the manner in which the coins they have examined have been found to vary from the weight and fineness required by the indenture, and whether, and how much, the variations exceed, or fall short of, the remedies which are allowed; and, according to the terms of the verdict, the master's quietus is either granted or withheld.'—Archæologia, vol. xvi.

PIZARRO (Francis), a celebrated Spanish general, the discoverer and conqueror of Peru, in conjunction with Diego Almagro, a Spanish navigator. They are both chargeable with great cruelty to the inhabitants; and they fell victims to their own ambition, jealousy, and avarice. Almagro, revolting, was defeated and beheaded by Pizarro, who was assassinated by Almagro's friends in 1541. See PERU.

PIZ'ZLE, *n. s.* [quasi pissle.—Minsheu]. The urinary organ of the bull.

The *pizzle* in animals is official to urine and generation. *Browne.*

PLACARD', *n. s.* } Span. *placart;* Belg.
PLACART'. } *plakaert;* Fr. *placard.* An edict; public declaration; manifesto.

The word *placard* is also used for a libel or lampoon. At Rome, *placards* against the pope are frequently fixed, in the night-time, to the statue of Pasquin. *Dr. A. Rees.*

PLA'CATE, *v. a.* } Lat. *placco.* To ap-
PLA'CABLE, *adj.* } pease; pacify, reconcile:
PLACABIL'ITY, *n. s.* } placable is, possible or
PLA'CABLENESS. } willing to be appeased; merciful: placability and placableness mean the disposition of being so.

That the effect of an atonement and reconciliation was to give all mankind a right to approach and rely on the protection and beneficence of a *placated* deity, is not deducible from nature. *Forbes.*

Since I sought
By prayer the' offended deity t' appease;
Methought I saw him *placable* and mild,
Bending his ear. *Milton's Paradise Lost.*

Those implanted anticipations are, that there is a God, that he is *placable,* to be feared, honoured, loved, worshipped, and obeyed. *Hale.*

The various methods of propitiation and atonement shew the general consent of all nations in their opinion of the mercy and *placability* of the divine nature. *Anonymous.*

PLACE', *n. s.* & *v. a.* } Sax. þlæca; French
PLA'CER, *n. s.* } *place;* Teut. *platz;*
PLACE'MAN. } Spanish *plaza;* Ital. *piazza;* Latin *platea.* Space; locality; situation; state; room; way; residence; existence; office; rank; precedence: to place is, to put; fix; settle; deposit; establish: placer, one who places: a placeman is a pensioner on the government of a country.

Place such over them to be rulers. *Exodus* xviii. 21.

Search you out a *place* to pitch your tents. *Deuteronomy.*

Saul set him up a *place,* and is gone down to Gilgal. 1 *Samuel.*

He *placed* forces in all the fenced cities. 2 *Chronicles.*

Ye seek to kill me, because my word hath no *place* in you. *John* viii. 37.

The Romans shall take away both our *place* and nation. *John.*

Avenge not yourselves, but rather give *place* unto wrath. *Romans.*

Sovereign lord of creatures all,
Thou *placer* of plants, both humble and tall. *Spenser.*

What scripture doth plainly deliver, to that the first *place* both of credit and obedience is due. *Hooker.*

The horsemen came to Lodronius, as unto the most valiant captain, beseeching him, instead of their treacherous general, to take upon him the *place.* *Knolles's History of the Turks.*

In his brain
He hath strange *places* crammed with observation. *Shakspeare.*

I know him a notorious liar;
Think him a great way fool, solely a coward;
Yet these fixed evils sit so fit in him,
That they take *place,* when virtue's steely bones
Look bleak in the cold wind. *Id.*

The heavens themselvas, the planets, and this center,
Observe degree, priority, and *place.* *Id.*

If I'm traduced by tongues that neither know
My faculties nor person,
'Tis but the fate of *place,* and the rough brake
That virtue must go through. *Id.*

Hosea saith of the Jews, they have reigned, but not by me; which *place* proveth, that there are governments which God doth not avow. *Bacon.*

They are defects, not in the heart, but in the brain; for they take *place* in the stoutest natures. *Id.*

All bodies are confined within some *place*;
But she all *place* within herself confines. *Davies.*

These fair overtures, made by men well esteemed for honest dealing, could take no *place*. *Hayward.*

Do you think I'd walk in any plot,
Where madam Sempronia should take *place* of me,
And Fulvia come i' the rear. *Ben Jonson's Catiline.*

There is no *place* of doubting, but that it was the very same. *Hammond's Fundamentals.*

Is not the bishop's bill denied,
And we still threatened to be tried?
You see the king embraces
Those counsels he approved before;
Nor doth he promise, which is more,
That we shall have their *places*.
Denham.

Here I could frequent
With worship, *place* by *place*, where he vouchsafed
Presence divine. *Milton's Paradise Lost.*

Our two first parents yet the only two
Of mankind in the happy garden *placed*.
Milton.

His catalogue had an especial *place* for sequestered divines. *Fell.*

Let the eye be satisfied in the first *place*, even against all other reasons, and let the compass be rather in your eyes than in your hands. *Dryden.*

Where arms take *place*, all other pleas are vain;
Love taught me force, and force shall love maintain.
Id.

He stood astride, and to his fellows cried,
Give *place*, and mark the difference if you can
Between a woman warrior and a man. *Id.*

Those accusations had been more reasonable, if *placed* on inferior persons. *Id. Aurengzebe.*

Place is the relation of distance betwixt any thing and any two or more points considered as keeping the same distance one with another; and so as at rest: it has sometimes a more confused sense, and stands for that space which any body takes up. *Locke.*

There would be left no measures of credible and incredible, if doubtful propositions take *place* before self-evident. *Id.*

I could not pass by this *place*, without giving this short explication.
Burnet's Theory of the Earth.

Pensions in private were the senate's aim;
And patriots for a *place* abandoned fame. *Garth.*

I will teach him the names of the most celebrated persons who frequent that *place*. *Addison.*

We shall extinguish this melancholy thought, of our being overlooked by our Maker, if we consider, in the first *place*, that he is omnipresent; and, in the second, that he is omniscient. *Id.*

As a British freeholder, I should not scruple taking *place* of a French marquis. *Id. Freeholder.*

It is stupidly foolish to venture our salvation upon an experiment, which we have all the reason imaginable to think God will not suffer to take *place*.
Atterbury.

Some magistrates are contented that their *places* should adorn them; and some study to adorn their *places*, and reflect back the lustre they receive from thence. *Id.*

Mixt government, partaking of the known forms received in the schools, is by no means of Gothick invention, but hath *place* in nature and reason.
Swift.

'Twas his care
To *place* on good security his gold. *Pope.*

God would give them, in their several *places* and callings, all spiritual and temporal blessings, which he sees wanting to them. *Duty of Man.*

But all shall give account of every wrong,
Who dare dishonour or defile the tongue;
Who prostitute it in the cause of vice,
Or sell their glory at the market price;
Who vote for hire, or point it with lampoon,
The dear-bought *placeman*, and the cheap buffoon.
Cowper.

Place, in astronomy, the place of the sun, a star, &c., denotes the sign and degree of the zodiac which the luminary is in; or the degree of the ecliptic, reckoning from the beginning of Aries, which the planet or star's circle of longitude cuts; and therefore coincides with the longitude of the sun, planet, or star. The place of the moon, being that part of her orbit wherein she is found at any time, is of various kinds, by reason of the great inequalities of the lunar motions, which render a number of equations and reductions necessary before the just point be found. See Astronomy.

PLACENTA, in anatomy. See Midwifery and Anatomy.

PLACENTIA Bay, an extensive bay on the south coast of Newfoundland; which forms a good harbour for vessels, and is much frequented by ships employed in the cod fishery. The entrance is a narrow channel through which only one ship can pass at a time; but the water is deep enough for the largest, and the harbour is capacious enough to hold 150 sail, which are there secure against all winds, and can fish as quietly as in a river. Before the narrow channel is a road of five miles extent, but exposed to the west winds. The current is very strong in the entrance, so that ships must be towed through it. The Great Strand is large enough to dry fish to load sixty vessels. There is beside a Little Strand used by the inhabitants of the town. The French first built some huts here with branches of pine-trees, for drying their fish in rainy weather. Near this are the houses of the inhabitants, which form a town called Placentia, in long. 54° to 55° 10′ W., lat. 47° to 47° 50′ N.

PLACENTIUS (Peter), a German poet, who wrote a Latin Poem of 360 verses, entitled Pugna Porcorum, in which every word begins with a P. He died in 1548.

PLACETTE (John De La), an eminent protestant minister, born at Pontac in Bern, in 1639; and educated by his father, who was also a clergyman. He exercised his office as a minister among the Protestants in France till the Revocation of the edict of Nantes in 1685, when he retired to Denmark, where he continued till the death of the queen, who had been his patron, in 1711. After her death he went to Holland, and settled first at the Hague, and finally at Utrecht, where he died in 1718, aged seventy-nine. He wrote many valuable works on religion and morality; besides some polemical pieces against the church of Rome. His treatise upon Conscience was translated into English by Dr. Basil Kennet, in 1705.

PLAC'ID, *adj.* } Lat. *placidus.* Gentle;
Plac'idly, *adv.* } quiet; mild; the adverb corresponding.

It conduceth unto long life and to the more *placid* motion of the spirits, that men's actions be free. *Bacon.*

That *placid* aspect and meek regard,
Rather than aggravate my evil state,
Would stand between me and thy father's ire. *Milton.*

If into a phial, filled with good spirit of nitre, you cast a piece of iron, the liquor, whose parts moved uniformly and *placidly* before, by altering its motion it begins to penetrate and scatter abroad particles of the iron. *Boyle.*

The water easily insinuates itself into, and *placidly* distends the tubes and vessels of vegetables. *Woodward.*

PLAC'IT, *n. s.* Lat. *placitum.* Decree; determination.

We spend time in defence of their *placits*, which might have been employed upon the universal author. *Glanville.*

PLACK'ET, or PLAQUET, *n. s.* Qu. Fr. *plaquer.* A petticoat.

You might have pinched a *plaquet*, it was senseless. *Shakspeare.*

The bone ache is the curse dependant on those that war for a *plaquet.* *Id. Troilus and Cressida.*

PLAGIA'RISM, *n. s.* } Latin *plagium.*
PLAGIA'RY. } Theft: literary adoption of the thoughts or works of another; a plagiary is, he who commits this theft. Browne also uses this word for plagiarism.

Plagiary had not its nativity with printing, but began when the paucity of books scarce wanted that invention. *Browne.*

Without invention a painter is but a copier, and a poet but a *plagiary* of others; both are allowed sometimes to copy and translate. *Dryden.*

With great impropriety, as well as *plagiarism*, they have most injuriously been transferred into proverbial maxims. *South.*

The ensuing discourse lest I chance to be traduced for a *plagiary* by him who has played the thief, was one of those that, by a worthy hand, were stolen from me. *Id.*

PLAGIARY, in philology, is a purloiner of another man's works, who puts them off as his own. Among the Romans, plagiarius was properly a person who bought, sold, or retained a freeman for a slave; and was so called because, by the Flavian law, such persons were condemned ad plagas, 'to be whipped.' Thomasius has an express treatise De plagio literario, wherein he lays down the laws and measures of the right which authors have to one another's writings.—'Dictionary-writers,' it is observed by Chambers, 'seem exempted from the common laws of meum and tuum. Their works are supposed, in great measure, compositions of other people; and what they take from others they take avowedly. In effect, their quality gives them a title to every thing that may be for their purpose, wherever they find it; and if they rob, they do not do it any otherwise than as the bee does, for the public service. Their occupation is not pillaging, but collecting contributions; and, if you ask them their authority, they will produce you the practice of their predecessors of all ages and nations.'

PLAGUE', *n. s.* & *v. a.* } Teut., Belg., and
PLA'GUY, *adj.* } Dan. *plage;* Lat.
PLA'GUILY, *adv.* } *plaga.* Pestilence; a mortal or highly contagious disease; hence state of misery; any thing noisome or vexatious: to infect with pestilence or disease; oppress; trouble: teaze: plaguy and plaguily (both low words) follow the last sense of the verb.

I am set in my *plague*, and my heaviness is ever in my sight. *Psalm* xxxviii. 17.

If her nature be so,
That she will *plague* the man that loves her most,
And take delight to increase a wretch's woe,
Then all her nature's goodly gifts are lost. *Spenser.*

I am not mad, too well I feel,
The different *plague* of each calamity. *Shakspeare.*

Say my request's unjust,
And spurn me back; but, if it be not so,
Thou art not honest, and the gods will *plague* thee. *Id.*

Thou art a boil,
A *plague* sore, or imbossed carbuncle,
In my corrupted blood. *Id. King Lear.*

The general opinion is, that years hot and moist are most pestilent; yet many times there have been great *plagues* in dry years. *Bacon's Natural History.*

Of heats,
Add one more to the *plaguy* bill. *Donne.*

Snakes that use within thy house for shade,
Securely lurk, and, like a *plague*, invade
Thy cattle with venom. *May's Virgil.*

Please yourselves, therefore, ye sinful and natural men, with the spiritual condition wherein ye stand: God is no otherwise near to you, but to *plague* and punish you. *Bp. Hall.*

Thus were they *plagued*
And worn with famine. *Milton.*

What perils do environ
The man that meddles with cold iron!
What *plaguy* mischiefs and mishaps
Do dog him still with after-claps! *Hudibras.*

All those *plagues* which earth and air had brooded,
First on inferior creatures tried their force.
And last they seized on man. *Lee and Dryden.*

This whispering bodes me no good; but he has me so *plaguily* under the lash, I dare not interpret him. *Dryden.*

Good or bad company is the greatest blessing or greatest *plague* of life. *L'Estrange.*

When a Neapolitan cavalier has nothing else to do, he gravely shuts himself up in his closet, and falls a tumbling over his papers, to see if he can start a law suit, and *plague* any of his neighbours. *Addison.*

Sometimes my *plague*, sometimes my darling,
Kissing to day, to-morrow snarling. *Prior.*

People are stormed out of their reason, *plagued* into a compliance, and forced to yield in their own defence. *Collier.*

You looked scornful, and snift at the dean;
But he durst not so much as once open his lips,
And the doctor was *plaguily* down in the hips. *Swift.*

PLAGUE. See MEDICINE, Index. In that article we have noticed the most recent medical opinions upon this important subject, and have quoted the strong language of Dr. Gregory, that its being 'a highly contagious disease cannot for a moment be made a matter of dispute.' This has, however, of late become so seriously controverted, that a committee of the house of commons was for some time engaged on a review

of our Quarantine and Sanitary Laws, which government have already considerably relaxed. The whole question of the contagion of plague came thus before a high and most intelligent tribunal: the reader will find an account of the evidence and results in our article SANITARY LAWS. We shall in this place only notice the general account of historians respecting what has been called the plague in former times.

Thucydides, lib. ii., gives an account of a dreadful plague which happened at Athens about A. A. C. 430, and with which he himself was infected, while the Peloponnesians under the command of Archidamus wasted all her territory abroad; but of these two enemies the plague was by far the most severe. The most dreadful plague that ever raged at Rome was in the reign of Titus, A. D. 80. The emperor left no remedy unattempted to abate the malignity of the distemper, acting during its continuance like a father to his people. The same fatal disease raged in all the provinces of the Roman empire in the reign of M. Aurelius, A. D. 167, and was followed by a dreadful famine, earthquakes, inundations, and other calamities. About A. D. 430, the plague visited Britain, just after the Picts and Scots had made a formidable invasion of the southern part of the island. It raged with uncommon fury, and swept away most of those whom the sword and famine had spared, so that the living were scarcely sufficient to bury the dead. About A. D. 1348 this disease is said to have become almost general over Europe. Many authors give an account of it as having appeared first in the kingdom of Kathay in 1346, and to have proceeded gradually west to Constantinople and Egypt. From Constantinople it passed into Greece, Italy, France, and Africa, and by degrees along the coasts of the ocean into Britain and Ireland, and afterwards into Germany, Hungary, Poland, Denmark, and the other northern kingdoms. According to Antonius, archbishop of Florence, the distemper carried off 60,000 people in that city. In 1656 the plague was brought from Sardinia to Naples, being introduced into the city by a transport with soldiers on board. It raged with excessive violence, carrying off in less than six months 400,000 of the inhabitants. In 1720 the city of Marseilles was visited with this destructive disease, brought in a ship from the Levant; and in seven months, during which it continued, it carried off not fewer than 60,000 people. The ravages of this disease have been dreadful wherever it has made its appearance. On the first arrival of Europeans at the island of Grand Canary, it contained 14,000 fighting men, soon after which two-thirds of these inhabitants fell a sacrifice to the plague. The destruction it has made in Turkey in Europe, and particularly in Constantinople, must be known to every reader; and its fatal effects have been particularly heightened there by that firm belief which prevails among the people of predestination, &c. It is generally brought into European Turkey from Egypt; where it is very frequent, especially at Grand Cairo. To give even a list of all the plagues which have desolated many flourishing countries, would extend this article beyond all bounds, and minutely to describe them all is impossible. Respecting the plague which raged in Syria in 1760, we refer to the abbé Mariti's Travels through Cyprus, Syria, and Palestine, vol. I., p. 278—296. This plague was one of the most malignant and fatal that Syria ever experienced; for it scarcely made its appearance in any part of the body when it carried off the patient.

PLAICE, *n. s.* Belg. *plate;* Ital. *plutissa.* A flat fish.

Of flat fish there are soles, flowkes, dabs, and *plaice.* *Carew.*

PLAICE, or PLAISE, is the English name of a species of pleuronectes. See PLEURONECTES.

PLAIN, *adj., adv., n. s., & v. a.*
PLAINDEAL'ING, *adj. & n. s.*
PLAIN'LY, *adv.*
PLAIN'NESS, *n. s.*
PLAIN'WORK.
Fr. *plain;* Belg. *pleyn;* Latin *planus.* Flat; smooth; level; even; hence bare; unornamented; simple; not varied; and hence, metaphorically, evident; open; clear; artless; simple; mere: as an adverb, distinctly; simply: as a noun substantive, level open ground; opposed to that which is hilly or much diversified; a field of battle: as a verb active, to make level, or even (obsolete): plaindealing is, honest, open dealing; sincerity: plainly and plainness, follow all the senses of plain as an adjective: planwork is ordinary or common needle-work.

In a *plain* in the land of Shinar they dwelt. *Genesis.*

The string of his tongue was loosed, and he spake *plain.* *Mark.*

The south and south-east sides are rocky and mountainous, but *plain* in the midst. *Sandys.*

A plaining song, *plain*-singing voice requires,
For warbling notes from inward cheering flow. *Sidney.*

Well, said Basilius, I have not chosen Dametas for his fighting nor for his discoursing, but for his *plainness* and honesty, and therein I know he will not deceive me. *Id.*

It was his policy to leave no hold behind him; but to make all *plain* and waste. *Spenser.*

St. Augustine acknowledgeth that they are not only set down, but also *plainly* set down in scripture; so that he which heareth or readeth may without difficulty understand. *Hooker.*

He that beguiled you in a *plain* accent was a *plain* knave, which, for my part, I will not be. *Shakspeare. King Lear.*

Though I cannot be said to be a flattering honest man; it must not be denied, but I am a *plaindealing* villain. *Shakspeare.*

Coriolanus neither cares whether they love or hate him; and, out of his carelessness, lets them *plainly* see't. *Id.*

Think'st thou that duty shall have dread to speak,
When power to flattery bows; to *plainness* honour
Is bound, when majesty to folly falls? *Id.*

In choice of instruments, it is better to chuse men of a *plainer* sort, that are like to do that that is committed to them, and to report faithfully the success, than those that are cunning to contrive somewhat to grace themselves, and will help the matter in report. *Bacon's Essays.*

Give me leave to be *plain* with you, that yourself give no just cause of scandal. *Bacon.*

They erected their castles and habitations in the *plains* and open countries, where they found most

fruitful lands, and turned the Irish into the woods and mountains. *Davies.*

The Scots took the English for foolish birds fallen into their net, forsook their hill, and marched into the *plain* directly towards them. *Hayward.*

Upon one wing the artillery was drawn, every piece having his guard of pioneers to *plain* the ways. *Id.*

Of many *plain*, yet pious Christians, this cannot be affirmed. *Hammond's Fundamentals.*

They were wont to make their canoes or boats *plain* without, and hollow within, by the force of fire. *Heylin.*

I am no politician; and was ever thought to have too little wit, and too much *plaindealing* for a statesman. *Denham.*

Express thyself in *plain*, not doubtful words,
That ground for quarrels or disputes affords. *Id.*

They wondered there should appear any difficulty in any expressions which to them seemed very clear and *plain*. *Clarendon.*

They charged the enemies' horse so gallantly, that they gave ground; and at last *plainly* run to a safe place. *Id.*

By that seed
Is meant thy great Deliverer, who shall bruise
The serpent's head; whereof to thee anon
Plainlier shall be revealed.
Milton's Paradise Lost.

His diet was of the *plainest* meats, and commonly not only his dishes, but the parts of them were such as most others would refuse. *Fell.*

The experiments alledged with so much confidence, and told by an author that writ like a *plain* man, and one whose profession was to tell truth, helped me to resolve upon making the trial. *Temple.*

Thy vineyard must employ thy sturdy steer
To turn the glebe; besides thy daily pain
To break the clods and make the surface *plain*.
Dryden.

A crown of ruddy gold inclosed her brow,
Plain without pomp, and rich without a show. *Id.*
It looks as fate with nature's law may strive,
To shew *plaindealing* once an age would thrive.
Id.

If some pride with want may be allowed,
We in our *plainness* may be justly proud,
Whate'er he's pleased to own, can need no show.
Id.

Bring a *plaindealing* innocence into a consistency with necessary prudence. *L'Estrange.*

'Tis *plain* in the history, that Esau was never subject to Jacob. *Locke.*

My heart was made to fit and pair within,
Simple and *plain*, and fraught with artless tenderness. *Rowe.*

Hilly countries afford the most entertaining prospects, though a man would chuse to travel through a *plain* one. *Addison.*

It is *plain* that these discourses are calculated for none but the fashionable part of womankind.
Id. Spectator.

Goodman Fact is allowed by every body to be a *plain*-spoken person, and a man of very few words; tropes and figures are his aversion. *Addison.*

We see *plainly* that we have the means, and that nothing but the application of them is wanting. *Id.*

To speak one thing, mixed dialects they join;
Divide the simple, and the *plain* define. *Prior.*

Pour forth Britannia's legions on the *plain*.
Arbuthnot.

Plainness and freedom, an epistolary stile required.
Wake,

Our troops beat an army in *plain* fight and open field. *Felton.*

From Epiphanius's censure of Origen, one may perceive *plainly* that he thought the Anti-nicene church in general, both before and after Origen, to be of a very contrary judgment to that which he condemns in Lucian and Origen, that is, to Arianism.
Waterland.

Some have at first for wits, then poets past,
Turned criticks next, and proved *plain* fools at last.
Pope.

You write to me with the freedom of a friend, setting down your thoughts as they occur, and dealing *plainly* with me in the matter. *Id.*

As shades most sweetly recommend the light,
So modest *plainness* sets off sprightly wit. *Id.*
While here the ocean gains,
In other parts it leaves wide sandy *plains*. *Id.*
She went to *plainwork*, and to purling brooks. *Id.*
A man of sense can artifice disdain,
As men of wealth may venture to go *plain*.
Young.

There is little, however, that can be contradicted, even when a *plainer* tale comes to be told. *Johnson.*

PLAIN, *v. n.*
PLAINT, *n. s.*
PLAINTFUL, *adj.*
PLAINTIFF, *n. s.* & *adj.*
PLAINTIVE, *adj.*

Fr. *plaint*, *plaintif*; of Latin *plango*. To lament; complain: a plaint is, a lamentation; complaint; expression of injury or sorrow: plaintful, full of complaint; audibly sorrowful: plaintiff, the complainant of damage or injury in a law-suit (opposed to the defendant); it is also used by Prior as an adjective, for complaining; lamenting; or in the sense of plaintive.

Long since my voice is hoarse, and throat is sore,
With cries to skies, and curses to the ground:
But more I *plain*, I feel my woes the more. *Sidney.*
Then pour out *plaint*, and in one word say this:
Helpless his *plaint*, who spoils himself of bliss.
Id.

To what a sea of miseries my *plaintful* tongue doth lead me! *Id.*

The fox that first this cause of grief did find,
'Gan thus first *plain* his case with words unkind.
Spenser.

The incessant weeping of my wife,
And piteous *plainings* of the pretty babes,
Forced me to seek delays. *Shakspeare.*
Bootless are *plaints*, and cureless are my wounds.
Id.

There are three just grounds of war with Spain; one of *plaint*, two upon defence. *Bacon.*

Where though I mourn my matchless loss alone,
And none between my weakness judge and me;
Yet even these gentle walls allow my moan,
Whose doleful echoes to my *plaints* agree. *Wotton.*
How many children's *plaints* and mother's cries!
Daniel.

He to himself thus *plained*. *Milton.*
Listening where the hapless pair
Sat in their sad discourse, and various *plaint*,
Thence gathered his own doom.
Id. Paradise Lost.

For her relief,
Vext with the long expressions of my grief,
Receive these *plaints*. *Waller.*

You and I shall talk in cold friendship at a bar before a judge, by way of *plaintiff* and defendant.
Dryden.

His careful mother heard the *plaintive* sound,
Encompassed with her sea-green sisters round. *Id.*

The *plaintiff* proved the debt by three positive witnesses, and the defendant was cast in costs and damages. *L'Estrange.*

Can nature's voice
Plaintive be drowned or lessened in the noise ;
Then shouts as thunder loud affect the air ? *Prior.*

In such a case the *plaintiff* will be hiss'd,
My lord, the judges laugh, and you're dismissed.
Pope.

By woe the soul to daring actions swells ,
By woe, in *plaintless* patience it excels. *Savage.*

Leviathans in *plaintive* thunders cry. *Young.*

Defendant thus becomes a name,
Which he that bore it may disclaim ;
Since both in one description blended,
Are *plaintiffs*—when the suit is ended.
Cowper.

PLAINFIELD, a town of Cheshire county, New Hampshire, north America, on the Connecticut River, eleven miles south of Dartmouth College, and fourteen North of Claremont. Union Academy, a well endowed seminary, is in this place, and opposite to the town the Quechy flows into the Connecticut with a considerable fall.

PLAIT, *n. s.* & *v. a.* Corrupted from plyght, from to ply or fold. A fold; a double: to fold; weave; involve.

Let it not be that outward adorning of *plaiting* the hair. 1 *Peter.*

Should the voice directly strike the brain,
It would astonish and confuse it much ;
Therefore these *plaits* and folds the sound restrain,
That it the organ may more gently touch. *Davies.*

Time shall unfold what *plaited* cunning hides,
Who covers faults at last with shame derides.
Shakspeare.

'Tis very difficult to trace out the figure of a vest through all the *plaits* and foldings of the drapery.
Addison.

Nor shall thy lower garments artful *plait*,
From thy fair side dependent to thy feet,
Arm their chaste beauties with a modest pride,
And double every charm they seek to hide.
Prior.

Will she on Sunday morn thy neckcloth *plait ?*
Gay.

The busy sylphs surround their darling care,
Some fold the sleeve, while others *plait* the gown ;
And Betty's praised for labours not her own.
Pope.

Your hands have not been employed in *plaiting* the hair, and adorning your persons ; but in making cloaths for the naked. *Law.*

PLAN, *n. s.* & *v. a.* Fr. and Span. *plan* ; Lat. *planus.* Plot ; form ; scheme ; model : to scheme ; design.

Remember, O my friends, the laws, the rights,
The generous *plan* of power delivered down
From age to age to your renowned forefathers.
Addison.

Artists and *plans* relieved my solemn hours ;
I founded palaces, and planted bowers. *Prior.*

Vouchsafe the means of vengeance to debate,
And *plan* with all thy arts the scene of fate. *Pope.*

PLAN, in general, denotes the representation of something drawn on a plane; such are maps, charts, ichnographies, &c. See MAP, CHART, &c.

PLAN, in architecture, is particularly used for a draught of a building, as it bears on the ground, showing the extent, division, and distribution of its area or ground-plot into apartments, rooms, passages, &c. To render plans intelligible, it is usual to distinguish the massives with a black wash ; the projectures on the ground are drawn in full lines, and those supposed over hem in dotted lines. The augmentations or alterations to be made are distinguished by a color different from what is already built; and the tints of each plan made lighter as the stories are raised. In large buildings it is usual to have three several plans for the first three stories.

PLANCH'ED, *adj.* } Fr. *plancher.* Made
PLANCH'ER, *n. s.* } of boards; a floor so made.

He hath a garden circummur'd with brick,
Whose western side is with a vineyard backt,
And to that vineyard is a *planched* gate,
That makes his opening with this bigger key.
Shakspeare.

Oak, cedar, and chestnut, are the best builders ; some are best for *planchers*, as deal ; some for tables, cupboards, and desks, as walnuts. *Bacon.*

PLANCUS (Lucius Munatius), a writer of the Augustan age, an orator and a disciple of Cicero. He was with Cæsar in Gaul, and became governor of a province in Gallia Celtica (where he built Lugdunum, now Lyons) ; and was made consul with Brutus. He then favoured the republican cause, but afterwards deserted to Cæsar. He disgraced himself still more, by becoming a servile flatterer of Antony and Cleopatra ; to please whom he acted as a stage dancer, and in a comedy personated the sea-god Glaucus, by dancing quite naked, with his body painted green, a crown of reeds on his head, and the tail of a large fish appended to his back. Finding that this sycophantic adulation procured him contempt instead of approbation, even from Antony, he deserted to Octavius, before the battle of Actium ; who received him with great marks of respect ; which Plancus returned by proposing in the senate to confer on him the title of Augustus. About this period Horace dedicated his seventh Ode to him. The elegance of his Letters to Cicero, which are still extant, prove that he was not unworthy of a literary compliment.

PLANCUS (Francis), M. D., was born at Amiens in 1696, and was author of some celebrated works. 1. A complete System of Surgery, in 2 vols. 12mo. 2. A choice Library of Medicine, continued and completed by M. Goulin, making in all 9 vols. 4to., or 18 vols. 12mo. 3. A Translation of Vander Wiel's Observations on Medicine and Surgery, 1758, 2 vols. 12mo. Plancus was the editor of various editions of works on medicine and surgery, and enriched them with notes. He died September 19th, 1661, aged sixty-nine.

PLANE, *n. s.* & *v. a.* Lat. *planus.* In geometry, level surface : in carpentry, an instrument by which boards are made of level surface : to level, smooth ; use a plane.

The iron is set to make an angle of forty-five degrees with the sole of the *plane.* *Moxon.*

These hard woods are more properly scraped than *planed.* *Id. Mechanical Exercises.*

The foundation of the Roman causeway was made of rough stone, joined with a most firm cement ; upon this was laid another layer of small stones and cement, to *plane* the inequalities of the rough stone, in which the stones of the upper pavement were fixt.
Arbuthnot on Coins.

Comets, as often as they are visible to us, move in *planes* inclined to the *plane* of the eclipticK in all kinds of angles. *Bentley.*

Projectiles would ever move on in the same right line, did not the air, their own gravity, or the ruggedness of the plane on which they move, stop their motion. *Cheyne.*

PLANE, in geometry, denotes a surface that lies evenly between its bounding lines; and, as a right line is the shortest extension from one point to another, so a plane surface is the shortest extension from one line to another.

PLANE, in joinery, consists of a piece of wood, very smooth at bottom, as a stock or shaft; in the midst of which is an aperture, through which a steel edge, or chisel, placed obliquely, passes; which, being very sharp, takes off the inequalities of the wood along which it slides. Planes have various names, according to their various forms and uses: as, 1. The fore-plane, a very long one, and usually that which is first used: the edge of its iron or chisel is not ground straight, but rises with a convex arch in the middle; its use is to take off the greater irregularities of the stuff, and to prepare it for the smoothing-plane. 2. The smoothing-plane is shorter, its chisel being finer; and its use is to take off the greater irregularities left by the fore-plane, and to prepare the wood for the jointer. 3. The jointer is the longest of all; the edge of its chisel is very fine, and does not stand out above a hair's breadth; it is chiefly used for shooting the edge of a board perfectly straight, for jointing tables, &c. 4. The strike-block is like the jointer, but shorter: its use is to level short joints. 5. The rabbet-plane, which is used in cutting the upper edge of a board, straight down into the stuff, so that the edge of another cut after the same manner may join in with it, on the square: the chisel of this plane is as broad as its stock, that the angle may cut straight, and it delivers its shavings at the sides, and not at the top like the others. 6. The plough, which is a narrow-rabbet plane, with the addition of two staves, on which are shoulders; its use is to plough a narrow square groove on the edge of a board. 7. Moulding planes, which are of various kinds, accommodated to the various forms and profiles of the moulding; as the round-plane, the hollow-plane, the ogee, the snipe's-bill, &c., which are all of several sizes, from half an inch to an inch and a half.

PLANE, PERSPECTIVE, in perspective, is supposed to be pellucid, and perpendicular to the horizon; the horizontal plane, supposed to pass through the spectator's eye, parallel to the horizon; the geometrical plane, likewise parallel to the horizon, wherein the object to be represented is supposed to be placed, and as such brought direct to the eye of the spectator.

PLANE-TREE, *n. s.* Fr. *plane, platane*; Lat. PLATANUS, which see.

The beech, the swimming alder, and the *plane*. *Dryden.*

PLAN'ET, *n. s.*
PLAN'ETARY, *adj.*
PLANET'ICAL,
PLAN'ET-STRUCK.
Fr. *planette*; Lat. *planeta*; Greek πλανητης, wanderers. A star or heavenly body wandering or continually changing its position with respect to other stars See ASTRONOMY. Planetary and planetic mean erratic; pertaining to, or governed by, a planet or planets: planet-struck is used also in this last sense.

Barbarous villains! hath this lovely face
Ruled like a wandering *planet* over me,
And could it not enforce them to relent? *Shakspeare.*

We make guilty of our disasters the sun, the moon and stars, as if we were villains by an enforced obedience of *planetary* influence. *Id.*

Wonder not much if thus amazed I look,
Since I saw you, I have been *planetstruck*:
A beauty, and so rare, I did descry. *Suckling.*

And *planets, planet-struck* real eclipse
Then suffered. *Milton's Paradise Lost.*

Their *planetary* motions and aspects. *Milton.*

Darkling they mourn their fate, whom Circe's power,
That watched the moon and *planetary* hour,
With words, and wicked herbs, from human kind
Had altered. *Dryden.*

I was born in the *planetary* hour of Saturn, and I think I have a piece of that leaden *planet* in me; I am no way facetious. *Addison.*

PLANETARIUM, an astronomical machine, so called from its representing the motions, orbits, &c., of the planets, agreeably to the Copernican system. See ASTRONOMY.

PLANETARY SYSTEM is the system or assemblage of the planets, primary and secondary, moving in their respective orbits, round their common centre the sun. See ASTRONOMY, Index.

PLAN'ISPHERE, *n. s.* Lat. *planus* and *sphere*. A sphere projected on a plane: a map of one or both hemispheres.

PLANK, *n. s.* & *v. a.* Fr. *planche*; Arm. *plank*; Teut. *plankc*; Lat. *planca*. A thick strong board: to lay with planks.

If you do but *plank* the ground over it will breed salt-petre. *Bacon's Natural History.*

The doors of *plank* were; their close exquisite,
Kept with a double key. *Chapman's Odyssey*

The smooth *plank* new rubbed with balm. *Milton.*

A steed of monstrous height appeared;
The sides were *planked* with pine. *Dryden.*

PLANOCON'ICAL, *adj.* Lat. *planus* and *conus*. Level on one side and conical on others.

Some few are *planoconical*, whose superficies is in part level between both ends. *Grew's Museum.*

PLANOCON'VEX, *n. s.* Lat. *planus* and *convexus*. Flat on the one side and convex on the other.

It took two object-glasses, the one a *planoconvex* for a fourteen feet telescope, and the other a large double convex for one of about fifty feet. *Newton's Opticks.*

PLANT, *n. s.*, *v. a.*, & *v. n.*
PLANT'AGE, *n. s.*
PLANT'AL, *adj.*
PLANTA'TION, *n. s.*
PLANT'ED, *part.*
PLANT'ER, *n. s.*
Sax. plante; Fr. *plante*; Sp., Port., and Lat. *planta*, q. *palanta*, à *palo*?—Minsheu. A vegetable; any thing produced from seed: to set in the ground with a view to cultivate; hence to settle; establish: as a verb neuter, to perform the act of planting: plantage is an obsolete word for herbage: plantal,

pertaining to plants: plantation, the act or art of planting; place planted; hence a colony; establishment; foundation: planted is used by Shakspeare for well-grounded; settled: a planter is one who sets, sows, or cultivates plants; particularly applied to a cultivator of the West India colonies; one who introduces or disseminates any thing or system of things.

Plant not thee a grove of any trees near unto the altar of the Lord. *Deuteronomy* xvi. 21.

Butchers and villains,
How sweet a *plant* have you untimely cropt!
Shakspeare.

The fool hath *planted* in his memory
An army of good words. *Id.*

Truth, tired with iteration,
As true as steel, as *plantage* to the moon. *Id.*

If you *plant* where savages are, do not only entertain them with trifles and gingles, but use them justly. *Bacon.*

Planting of countries is like *planting* of woods: the principal thing that hath been the destruction of most *plantations* hath been the base and hasty drawing of profit in the first years; speedy profit is not to be neglected, as far as may stand with the good of the *plantation*. *Id. Essays.*

Episcopacy must be cast out of this church, after possession here from the first *plantation* of Christianity in this island. *King Charles.*

There's but little similitude betwixt a terreous humidity and *plantal* germinations. *Glanville.*

Take a *plant* of stubborn oak,
And labour him with many a sturdy stroke.
Dryden.

When Turnus had assembled all his powers,
His standard *planted* on Laurentum's towers;
Trembling with rage, the Latian youth prepare
To join the' allies. *Id. Æneis.*

There stood Sabinus, *planter* of the vines,
And studiously surveys his generous wines.
Dryden.

It continues to be the same *plant*, as long as it partakes of the same life, though that life be communicated to new particles of matter, vitally united to the living *plant*, in a like continued organisation, conformable to that sort of *plants*. *Locke.*

What do thy vines avail,
Or olives, when the cruel battle mows
The *planter's*, with their harvest immature?
Philips.

The next species of life above the vegetable is that of sense: wherewith some of those productions, which we call *plant*-animals, are endowed. *Grew.*

Virgil, with great modesty in his looks, was seated by Calliope in the midst of a *plantation* of laurel.
Addison.

Had these writings differed from the sermons of the first *planters* of Chistianity in history or doctrine, they would have been rejected by those churches which they had formed. *Id.*

That product only which our passions bear,
Eludes the *planter's* miserable care. *Prior.*

Once I was skilled in every herb that grew,
And every *plant* that drinks the morning dew.
Pope.

To build, to *plant*, whatever you intend,
In all let nature never be forgot. *Id.*

He to Jamaica seems transported,
Alone, and by no *planter* courted. *Swift.*

PLANTAGENET, the surname of fourteen kings of England, from Henry II. to Richard III. inclusive. See ENGLAND. Antiquarians are much at a loss to account for the origin of this name; the best derivation they can find for it is that Fulk, the first earl of Anjou of that name, being stung with remorse for some wicked action, went in pilgrimage to Jerusalem as a work of atonement; where, being soundly scourged with broom twigs, which grew plentifully on the spot, he ever after took the surname of Plantagenet, or broomstalk, which was retained by his noble posterity.

PLANTAGO, plantain, a genus of the monogynia order, and tetrandria class of plants. To this genus Linnæus has joined the coronopus and psyllium of Tournefort. There are several distinct species, and some varieties; but, as they are rarely cultivated, we only mention such of them as grow naturally in Britain, i. e. the common broad-leaved plantain, called way-bread; the great hoary plantain, or lamb's-tongue: the narrow-leaved plantain, or ribwort. The besom plantain, and rose-plantain, are accidental varieties which have also been found in England. Plantains are frequently very troublesome weeds. The common plantain and rib-wort plantain are both used in medicine. They are said to be slightly astringent; and the green leaves are commonly applied to fresh wounds.

PLANTAIN, *n. s.* Fr. *plantain*; Lat. *plantago.* An herb: a tree of the West Indies. See PLANTAGO.

The toad, being overcharged with the poison of the spider, as is believed, has recourse to the *plantain* leaf. *More.*

I long my careless limbs to lay
Under the *plantain's* shade. *Waller*

The most common simples are mugwort, *plantain*, and horse-tail. *Wiseman's Surgery.*

PLANTAIN, LITTLE WATER, the English name of the genus limosella.

PLANTATIONS, in English law. It seems to be doubtful whether all the settlements of our traders and navigators are within the statute of 7 and 8 Will. III. for regulating the plantation trade. But, whatever distinction may at one time have been made between the terms colony and plantation, there seems now to be none. The word plantation, it is said, first came into use, suggested by those of Ulster, Virginia, Maryland, and other places, which all implied the idea of introducing, instituting, and establishing, where every thing was desert before. Colony did not come much into use till the reign of Charles II., and seems to have denoted that kind of political relation in which the plantations stood to the mother country. Thus the different parts of New England were, in a great measure, voluntary societies planted without the direction or participation of the home government; so that, in the time of Charles II., there were not wanting persons who pretended to doubt of their constitutional dependence on the crown of England; and it was recommended, in order to put an end to such doubts, that the king should appoint governors, and 'so make them colonies.' A colony, therefore, might be considered as a plantation, when it had a governor and civil establishment, subordinate to the mother country. All the plantations in America, except those of New England, had such an establishment; and they were, upon that idea, colonies as well as plantations.—Tomlins.

Plantations or colonies, in distant countries, according to Blackstone, are either such where the lands are claimed by right of occupancy only, by finding them desert and uncultivated, and peopling them from the mother country; or where, when already cultivated, they have been either gained by conquest or ceded by treaties. And both these rights are founded upon the law of nature, or at least upon that of nations. But there is a difference between these two species of colonies, with respect to the laws by which they are bound. For it has been held that, if an uninhabited country be discovered and planted by English subjects, all the English laws then in being, which are the birth-right of every subject, are immediately there in force. But this must be understood with very many, and very great restrictions. Such colonists carry with them only so much of the English law as is applicable to their own situation and the condition of an infant colony; such, for instance, as the general rules of inheritance, and of protection from personal injuries. The artificial refinements and distinctions incident to the property of a great and commercial people, the laws of police and revenue (such especially as are enforced by penalties), the mode of maintenance for the established clergy, the jurisdiction of spiritual courts, and a multitude of other provisions, are neither necessary nor convenient for them, and therefore are not in force. What shall be admitted and what rejected, at what times and under what restrictions, must, in case of dispute, be decided in the first instance by their own provincial judicature, subject to the revision and control of the king in council: the whole of their constitution being also liable to be new modelled and reformed by the general superintending power of the legislature in the mother country. But in conquered or ceded countries, that have already laws of their own, the king may indeed alter and change those laws: but, till he does actually change them, the ancient laws of the country remain in force; unless such as are against the law of God, as in the case of an infidel country.—7 Rep. 17: Calvin's Case. [How then is the murderous law of the Suttees still recognised in Hindostan?] See, in the case of Campbell v. Hall, an elaborate argument of lord Mansfield, to prove the king's legislative authority, by his prerogative alone, over a ceded or conquered country.—Cowp. 204. Our American plantations are principally of this latter sort, being obtained in the last century, either by right of conquest and driving out the natives, or by treaties. And therefore the common law of England, as such, has no allowance or authority there; they being no part of the mother country, but distinct (though dependent) dominions. They are subject, however, to the control of the parliament; though (like the Isle of Man, and the rest) not bound by any acts of parliament, unless particularly named.—1 Comm. Itrod. § 4.

With respect to their interior polity, our colonies are stated by Blackstone to be properly of three sorts: 1. Provincial establishments; the constitutions of which depend on the respective commissions issued by the crown to the governors, and the instructions which usually accompany those commissions; under the authority of which provincial assemblies are constituted, with the power of making local ordinances, not repugnant to the laws of England. 2. Proprietary governments; granted out by the crown to individuals, in the nature of feudatory principalities, with all the inferior regalities, and subordinate powers of legislation, which formerly belonged to the owners of counties palatine: yet still with these express conditions, that the ends for which the grant was made be substantially pursued, and that nothing be attempted which may derogate from the sovereignty of the mother country. 3. Charter governments; in the nature of civil corporations, with the power of making bye-laws for their own interior regulation, not contrary to the laws of England; and with such rights and authorities as are specially given them in their several charters of incorporation. The form of government in most of them is borrowed from that of England. They have a governer named by the king (or in some proprietary colonies by the proprietor), who is his representative or deputy. They have courts of justice of their own, from whose decisions an appeal lies to the king and Council here in England. Their general assemblies, which are their House of Commons, together with their Council of State, being their upper house, with the concurrence of the king or his representative, the governor, make laws suited to their own emergencies. But it is particularly declared by stat. 7 and 8 W. III., c. 22, that all laws, bye-laws, usages, and customs, which shall be in practice in any of the plantations, repugnant to any law made or to be made in this kingdom relative to the said plantations, shall be utterly void and of none effect. And, because several of the colonies had claimed the sole and exclusive right of imposing taxes upon themselves, the statute 6 Geo. III., c. 12, was passed, expressly declaring that all his majesty's colonies and plantations in America have been, are, and of right ought to be, subordinate to, and dependent upon the imperial crown and parliament of Great Britain, who have full power and authority to make laws and statutes of sufficient validity to bind the colonies and people of America, subjects of the crown of Great Britain, in all cases whatsoever. This authority was afterwards enforced by stat. 7 Geo. III. c. 59, for suspending the legislation of New York; and by several subsequent statutes: but in the year 1782, by stat. 22 Geo. III. c. 46, his majesty was empowered to conclude a truce or peace with the colonies of New Hampshire, Massachusett's Bay, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, the three lower counties on Delaware, Maryland, Virginia, North Carolina, South Carolina, and Georgia in North America; and for that purpose to repeal, or to suspend, the operation of any acts of parliament so far as they related to the said colonies. A peace was soon after concluded, and the independence, which the above mentioned colonies had before declared, was confirmed to them, under the title of the United States of America.

5 Geo. II. c. 7 regulates suits in the courts of law and equity in the plantations; and makes

houses, lands, negroes, and real estates, assets to pay debts. 13 Geo. III. c. 14 enforces mortgages of estates in the West India colonies, and the mode of proceeding to foreclose the same. 22 Geo. III. c. 75 declares that offices in plantations shall only be granted by patent, during the residence of the grantee and quamdiu se bene gesserit: and, on absence or misbebaviour, the officer is removeable by the governor and council, who may also give leave of absence. By stat. 11 and 12 Wil. III. c. 12, confirmed and extended by 42 Geo. III. c. 85, all offences committed by governors of plantations, or any other persons in the execution of their offices, in any public service abroad, may be prosecuted in the court of king's bench in England. The indictment is to be laid in Middlesex; and the offenders are punishable as if the offence had been committed in England, and also incapacitated from holding any office under the crown. The court of king's bench is empowered to award a mandamus to any court of judicature, or to the governor, &c., of the county where the offence was committed, to obtain proofs of the matter alleged: and the evidence is to be transmitted back to that court, and there admitted on the trial.

As to the laws and government of particular colonies or plantations, we must refer to the alphabetical account of them.

PLANTIN (Christopher), a celebrated printer born near Tours in 1533. He settled at Antwerp, and there erected a printing-office, which was considered as the chief ornament of the town, being one of the finest printing-offices in Europe. He died in 1598, aged sixty-five; and left a most sumptuous and valuable library to his grandson Balthasar.

PLANTING, in agriculture and gardening. See RURAL ECONOMY and WOODS.

PLASENCIA, a town in the interior of Estremadura, Spain, situated in a narrow, fertile valley, watered by the river Xerte. It covers a large extent of ground, is a bishop's see, and has a good but irregular cathedral, seven churches, seven convents, and a splendid mansion belonging to the Mirabel family. This town, though not, as has been supposed, the Ambracia of the Romans, is of ancient date, and has several antiquities, in particular an aqueduct of eighty arches, still in such preservation as to convey water. Inhabitants 4800. 120 miles west by south of Madrid, and fifty-two north by west of Truxillo.

PLASH, *n. s.* } Belg. *plas, plasche;* Dan. PLASH'Y, *adj.* } *platz;* qu. Lat. *palus*? A small lake of water; a puddle; a marshy place: plashy is, watery; miry.

He leaves
A shallow *plash* to plung him in the deep,
And with satiety seeks to quench his thirst.
Shakspeare.

Two frogs consulted in the time of drought, when many *plashes* that they had repaired to were dry, what was to be done? *Bacon.*

I understand the aquatile or water-frog, whereof in ditches and standing *plashes* we behold millions. *Browne.*

Near stood a mill in low and *plashy* ground. *Betterton.*

With filth the miscreant lies bewrayed,
Fallen in the *plash* his wickedness had laid.
Pope.

PLASH, *n. s.* & *v. a.* Fr. *plessez.* A branch interwoven with others. To interweave branches. An operation thought by some persons to promote the growth and continuance of old hedges.

Plant and *plash* quicksets, *Evelyn.*

In the *plashing* your quick, avoid laying of it too low and too thick, which makes the sap run all into the shoots, and leaves the *plashes* without nourishment. *Mortimer.*

PLASM, *n. s.* Gr. πλασμα. A mould; a matrix, in which any thing is cast.

The shells served as *plasms* or mounds to this sand, which, when consolidated, and freed from its investient shell, is of the same shape with the cavity of the shell. *Woodward.*

PLASSEY, a town, plain, and grove, near the city of Muxadah, in India, celebrated for a battle fought between the British under lord Clive, and the native Hindoos under the nabob Surajah Dowlah, in 1757. The British army consisted of about 1200 men, of whom the Europeans did not exceed 900; while that of the nabob consisted of 50,000 foot and 18,000 horse. Notwithstanding this great disproportion, however, lord Clive effectually routed the nabob and his forces, with the loss of three Europeans and twenty-six sepoys killed, and five Europeans and forty sepoys wounded. The nabob's loss was estimated at about 200 men, besides oxen and elephants.

PLAS'TER, *n. s.* & *v. a.* } Fr. *plaster*, from PLAS'TERER, *n. s.* } Latin *emplastrum;* Belg. *plaster;* Gr. πλαζω. Substance made of water and some absorbent matter, such as chalk or lime well pulverised; a glutinous or adhesive salve: to overlay or apply plaster: a plasterer is one whose trade is to lay on plaster.

In the same hour came forth the fingers of a man's hand, and wrote upon the *plaster* of the wall. *Daniel*

A heart settled upon a thought of understanding is as a fair *plastering* on the wall. *Eccles.*

Seeing the sore is whole, why retain we the *plaster*? *Hooker.*

You rub the sore,
When you should bring the *plaster*.
Shakspeare

Boils and plagues
Plaster you o'er, that one infect another
Against the wind a mile. *Id.*

The harlot's cheek beautied with *plastering* art. *Id.*

Thy father was a *plasterer*,
And thou thyself a shearman. *Id.*

With cement of flour, whites of eggs, and stone powdered, piscini mirabilis is said to have walls *plastered*. *Bacon.*

The *plasterer* makes his figures by addition, and the carver by subtraction. *Wotton.*

It not only moves the needle in powder, but likewise, if incorporated with *plasters*, as we have made trial. *Browne.*

Plasters, that have any effect, must be by dispersing or repelling the humours. *Temple.*

Plaster the chinky hives with clay. *Dryden.*

In the worst Inn's worst room, with mat half-hung,
The floors of *plaster*, and the walls of dung. *Pope.*

The brain is grown more dry in its consistence, and receives not much more impression, than if you wrote with your finger on a *plastered* wall.
Watts's Improvement of the Mind.

Well, figure to your senses straight,
Upon the house's topmost height,
A closet, just six feet by four,
With white-washed walls and *plastered* floor.
Kirke White.

Plaster, in pharmacy, an external application of a harder consistence than an ointment; to be spread, according to the different circumstances of the wound, place, or patient, either upon linen or leather. See Pharmacy.

Plaster, or Plaister, in building, a composition of lime, sometimes with sand, &c., to cover the nudities of a building. See Pargeting and Stucco.

Plaster of Paris, a preparation of several species of gypsum dug near Mont Martre, a village near Paris; whence the name. The best sort is hard, white, shining, and marbly. It neither gives fire with steel, nor ferments with aquafortis; but readily calcines into a fine plaster, the use of which in building and casting statues is well known. Two or three spoonfuls of burnt alabaster, mixed up thin with water, in a short time coagulate, at the bottom of a vessel full of water, into a hard lump, notwithstanding the water that surrounded it. Artificers observe, that the coagulating property of burnt alabaster will be very much impaired or lost, if the powder be kept too long, especially in the open air, before it is used; and when it has been once tempered with water, and suffered to grow hard, they cannot, by any burning or powdering of it again, make it serviceable for their purpose as before. This matter, when wrought into vessels, &c., is still of so loose and spongy a nature, that the air has easy passage through it. Mr. Boyle gives an account, among his experiments with the air-pump, of his preparing a tube of this plaster, closed at one end and open at the other; and, on applying the open end to the cement, as is usually done with the receivers, it was found utterly impossible to exhaust all the air out of it; for fresh air from without pressed in as fast as the other, or internal air, was exhausted, though the sides of the tube were of a considerable thickness. A tube of iron was then put on the engine; so that, being filled with water, the tube of plaster of Paris was covered with it; and, on using the pump, it was immediately seen, that the water passed through into it as easily as the air had done, when that was the ambient fluid.

The method of representing a face truly in plaster of Paris is this:—The person, whose figure is designed, is laid on his back, with any convenient thing to keep off the hair. Into each nostril is conveyed a conical piece of stiff paper, open at both ends, to allow of respiration. These tubes being anointed with oil, are supported by the hand of an assistant; then the face is lightly oiled over, and, the eyes being kept shut, alabaster, fresh calcined, and tempered to a thinnish consistence with water, is by spoonfuls nimbly thrown all over the face, till it lies near the thickness of an inch. This matter grows sensibly hot, and in about a quarter of an hour hardens into a kind of stony concretion; which, being gently taken off, represents, on its concave surface, the minutest part of the original face. In this a head of good clay may be moulded, and therein the eyes are to be opened, and other necessary amendments made. This second face being anointed with oil, a second mould of calcined alabaster is made, consisting of two parts joined lengthwise along the ridge of the nose; and herein may be cast, with the same matter, a face extremely like the original.

Plaster of Paris casts from the antique are cheap, and offer a facility to the artist of studying the most beautiful productions of the great masters of sculpture without the necessity either of travelling or incurring heavy expenses; while, at the same time, the amateur is gratified by having it in his power to adorn his rooms with facsimiles of the finest productions of ancient art, which would otherwise exist only for the benefit and delight of the fortunate few.

Plaster of Paris, diluted with water into the consistence of a soft or thin paste, quickly sets or grows firm, and its bulk is thereby increased; for Mr. Boyle found that a glass vessel, filled with the fluid mixture, and closely stopped, burst when the mixture set, and sometimes a quantity of water issued through the cracks. This expansion of the plaster, in passing from a soft to a firm state, is one of its valuable properties; rendering it an excellent matter for filling cavities in sundry works, where other earthy mixtures would shrink and leave vacuities, or entirely separate from the adjoining parts.

It is probable, also, that this expansion of the plaster might be made to contribute not a little to the elegance of the impressions which it receives from medals, &c., by properly confining the soft matter, that its expansion may force it into the minutest traces of the figure.

If finely powdered alabaster, or plaster of Paris, be put into a basin over a fire, it will, when hot, assume the appearance of a fluid, by rolling in waves, yielding to the touch, steaming, &c., all which properties it again loses on the departure of the heat; and being thrown upon paper will not at all wet it, but immediately discover itself to be as motionless as before it was set over the fire.

Plasterer's Company, in heraldry, was incorporated in 1500. Their arms are, as in the annexed figure, *azure*, on a chevron *gules*, between a trowel and two hatchets, handles of the second; headed argent in chief, and a treble brush in base proper; a rose *gules* seeded *or*, between two fleurs-de-lis of the first.

PLASTIC, *adj.* Gr. πλαςικος. Having the power to give form.

Benign Creator! let thy *plastick* hand
Dispose its own effect. *Prior.*

There is not any thing strange in the production of the formed metals, nor other *plastick* virtue concerned in shaping them into those figures, than merely the configuration of the particles.
Woodward's Natural History.

Plastic Art, the art of representing all sorts of figures by the means of moulds. This term is derived from the Gr. πλαςικη, the art of forming

modelling, or casting in a mould. The artist makes use of moulds to form figures in bronze, lead, gold, silver, or any other metal or fusible substance. The mould is made of clay, stucco, or other composition, and is hollowed into the form of the figure that is to be produced; they then apply the jet, which is a sort of funnel, through which the metal is poured that is to form the figures. It is thus, after much practice and attention, that the artist forms, 1. Equestrian and pedestrian statues of every kind: 2. Groups; 3. Pedestals; 4. Bas-reliefs; 5. Medallions; 6 Cannons, mortars, and other pieces of artillery 7. Ornaments of architecture, as capitals, base &c.; 8. Various sorts of furniture, as lustres, branches, in every kind of metal; and in the same manner figures are cast in stucco, plaster, or any other fusible matter. Wax being a substance that is very easily fused much use is made of it. There are impressions which are highly pleasing in colored wax, of medallions, basso and alto relievos, and of detached figures; which, however, are somewhat brittle. There is also another method of taking the impressions of medals and coins, which is as follows:—They wash or properly clean the piece whose impression is to be taken, and surround it with a border of wax. They then dissolve isinglass in water, and make a decoction of it, mixing with it some vermilion, to give it an agreeable red color. They pour this paste, when hot, on the stone or medal, to the thickness of about the tenth part of an inch; then leave it exposed to the sun, in a place free from dust. After a few days this paste becomes hard, and offers to the eye the most admirable and faithful representation of the medal that it is possible to conceive: they are then carefully placed in drawers; and thousands of these impressions, may be included in a small compass. The proficients in plastics have likewise invented the art of casting in a mould papier maché or dissolved paper, and forming it into figures, in imitation of sculpture, of ornaments and decorations for ceilings, furniture, &c., and which they afterwards paint or gild. There are, however, some inconveniences attending this art; as, for example, the imperfections in the moulds, which render the contours of the figures inelegant, and give them a heavy air: these ornaments, moreover, are not so durable as those of bronze or wood, seeing that in a few years they are preyed on by worms. The figures that are given to porcelain, Delft ware, &c., belong also to plastics; for they are formed by moulds, as well as by the art of the sculptor and turner; and by all these arts united are made vases of every kind, figures, groups, and other designs, either for use or ornament.

Plastic Nature, a certain power by which, as an instrument, many philosophers, both ancient and modern, have supposed the great motions in the corporeal world, and the various processes of generation and corruption, to be perpetually carried on. Among the philosophers of Greece, such a power was almost universally admitted. It seems, indeed, to have been rejected only by the followers of Democritus and Epicurus, who thought gravity essential to matter, and the fortuitous motion of atoms, which they held to have been from eternity, the source, not only of all the regular motions in the universe, but also of the organisation of all corporeal systems, and even of sensation and intellection in brutes and in men. It is evident that those men, whatever they might profess, were in reality atheists; and Democritus avowed his atheism. The greater part of the philosophers who held the existence of a plastic nature considered it not as an agent in the strict sense of the word, but merely as an instrument in the hand of the deity; though even among them there were some who held no superior power, and were, of course, as gross atheists as Democritus himself. Such was Strato of Lampsacus, who was originally of the peripatetic school, over which he presided many years with great reputation. He was the first and chief assertor of what has been termed hylozoic atheism; a system which admits of no power superior to a certain natural or plastic life, essential, ingenerable, and incorruptible, inherent in matter, but without sense and consciousness. That such was his doctrine we learn from Cicero. Cicero adds, however, that Strato, in admitting this plastic principle, differed widely from Democritus. That the rough and smooth, and hooked and crooked atoms of Democritus were, indeed, dreams and fancies, is a position which no sensible person will controvert; and surely Strato was himself as great a dreamer, when he made sensation and intelligence result from a certain plastic or spermatic life in matter, which is itself devoid of sense and consciousness. It is, indeed, inconceivable, to use the emphatic language of Cudworth, 'how any one in his senses should admit such a monstrous paradox as this, that every atom of dust has in itself as much wisdom as the greatest politician and most profound philosopher, and yet is neither conscious nor intelligent!'

PLASTRON, *n. s.* Fr. *plastron.* A piece of leather stuffed, in order to receive the pushes of fencers.

Against the post their wicker shields they crush,
Flourish the sword, and at the *plastron* push.
Dryden.

PLAT, *v. a.* From Plait, which see. To weave; make by texture.

I have seen nests of an Indian bird curiously interwoven and *platted* together.
Ray on the Creation.

I never found so much benefit from any expedient, as from a ring, in which my mistress's hair is *platted* in a kind of true lover's knot. *Addison.*

Plat, *n. s.* More properly Plot, which see. A small piece of ground.

Such pleasure took the serpent to behold
The flowery *plat*, the sweet recess of Eve.
Milton.

On a *plat* of rising ground,
I hear the far-off curfew sound,
Over some wide watered shore,
Swinging slow with sullen roar. *Id.*

It passes through banks of violets and *plats* of willow of its own producing. *Spectator.*

PLATA, Rio de la, a river of South America, for a short time after 1515 called the river of De Solis, from Juan Diaz de Solis its dis-

coverer. Sebastian Cabot, however, having taken on its banks a considerable booty from the Indians, gave it its present name. Estimated by the body of water which it pours into the ocean, it is one of the largest rivers in the world. It is, however, properly speaking, but a continuation of the PARAGUAY and PARANA, which see. See also AMERICA, SOUTH.

When the Parana takes its more decisive bend to the south-east to join the Uruguay, and the two streams expand together, they become properly the La Plata, and through this channel the body of water formed by the confluence of the Parana, the Paraguay, and the Uruguay, flows into the ocean and forms an estuary of fresh water without parallel for width and magnificence. It is 150 miles broad at its mouth, from Cape St. Maria to Cape St. Anthony: but some geographers have considered the point of Monte Video on one side, and the Punta de Piedras or Stony Point on the other, as its proper boundaries. Between those promontories it is about eighty miles broad. The water, however, neither loses its freshness, nor feels the influence of the tide in any considerable degree, between the first mentioned extremities. At Buenos Ayres, about 200 miles from the mouth, it is about thirty miles broad; and, the shores being little elevated, the eye can seldom reach from one side to the other. This noble expanse is notwithstanding its extent, deformed by rocks and sand-banks, and rendered of dangerous navigation by shoals and shallows. Impetuous torrents of wind also sweep, at intervals, over the vast plains of the Pampas, to the south-west of Buenos Ayres, and rush down this wide opening with amazing fury. It has been observed, however, that a thunder-storm generally precedes the ravages of the Pamperos, and gives sufficient notice to mariners to prepare for them. The only port in this quarter which is adapted for the safety of ships of considerable burden is that of Monte Video; though those of Maldonado, Barragon, Buenos Ayres, and Colonia, afford anchorage.

The La Plata was formerly it is said navigable as high as the city of Assumption for large ships; but from the accumulations of sand this is certainly now impracticable. There are two great banks, which are the terror of mariners; i. e. the English and the Ortiz bank. The former is the most advanced toward the ocean, and is of considerable extent. Occasionally, and when the floods come down the rivers, it is covered for several fathoms, but has in general only a few feet water: the same may be said of the Ortiz bank, which lies higher up, and more across the river, being of greater length but less breadth. Still further to perplex the navigation here is a reef of rocks and shoals stretching out from Punta de Piedras, and rendering the entrance along the southern shores of the river of great intricacy and danger. The northern channel is at once narrower and deeper than the southern. Ships generally make Cape St. Maria; and their best way is to range along the northern shore, till they are clear of the Ortiz, between which and Fisher's bank, off Colonia or St. Sacrament, there is a good passage to the road of Buenos Ayres. In the lower part of the river [illegible]e are very few islands. That of de Lobos, [illegible] Wolves (so called from the seals and other amphibious animals that frequent it), lies off the Punta de Este, surrounded by dangerous rocks. The Isle de Flores, or of Flowers, lies between the English bank and the port of Monte Video, and affords tolerable anchorage. San Gabriel protects the roadstead of St. Sacrament, until near the confluence of the Uruguay and the Parana; where on one side is the island of Martin Garcia, and on the other that of Palmas. The difficulties of this navigation have been found to be much exaggerated by the policy of the Spaniards. The soundings decrease regularly from fifteen to four and three fathoms water, and the bottom varies from sand at the mouth, to rocky clay, thick mud, and sediment.

PLATÆA, or PLATÆÆ, an ancient and strong town of Bœotia, at the foot of Mount Citheron, on the borders of Megaris and Attica, between Mount Cithæron and Thebes; famous for a battle fought between Mardonius, the Persian general, and the united Spartans and Athenians, under Pausanias and Aristides, wherein the former were defeated with great slaughter. The Persian army consisted of 300,000 men, of whom scarcely 3000 escaped. The Grecian army lost only ninety-one Spartans, fifty-two Athenians, and sixteen Tegeans. The plunder of the Persian camp was immense. This decisive victory, which from that period secured the liberties of Greece against the power of the Persians, was fought on the 22nd of September, A. A. C. 479, the same day on which the Greeks obtained another important victory at Mycale. See MYCALE. The Greeks, in memory of it, built a temple to Jupiter Eleutherius, and instituted the games called Eleutheria. Platæa was taken by the Thebans, after a famous siege in the beginning of the Peloponnesian war; and afterwards destroyed by the Spartans A. A. C. 427. It was rebuilt by Alexander the Great; but is now in ruins. These may, however, be traced in all their extent. Their form is triangular, the circuit about 3200 yards, or a mile and three quarters. At the south angle evidently stood the citadel; the whole remaining masonry consists of blocks accurately hewn and well put together.

PLATÆANS, the people of Platæa. They were greatly attached to the Athenians, and sent them 1000 men, when Greece was invaded by Datis the general of Darius.

PLATALEA, the spoonbill, in ornithology, a genus belonging to the order of grallæ. The beak is plain, and dilates towards the point into an orbicular form; the feet have three toes, and are half palmated. The species are distinguished by their color.

1. P. ajaja, the roseate spoonbill, is but a little less than the white. The bill is marked all round with a furrow parallel to the edge, and is of a grayish white color, so transparent as to show the ramification of the blood-vessels belonging to it; the forehead is of a whitish color between the bill and eyes and throat; the plumage is a fine rose color, deepest on the wings; the legs are gray, the claws blackish, and the

toes have membranes as in the next species. The variety of this species is entirely of a beautiful red color, having a collar of black at the lower part of the neck; the irides are red. Latham imagines it is the roseate in full plumage. It is said to be of a blackish chestnut the first year; becomes rose-colored the second; and of a deep scarlet the third. It lives on small fish.

2. P. leucorodia, the white spoonbill, is about the size of a heron, but somewhat shorter in the neck and legs. The bill is more than half a foot long, and, like that of the rest of the genus, is shaped like a spoon; the color of the bill is very various, being in some birds black; in others brown, and sometimes spotted; from the base to two-thirds of its length several indentations cross it, the rising parts of which are of a dark color; the tongue is short and heart-shaped, the irides are gray, the skin of the lore round the eyes and of the throat is bare and black, the plumage is entirely white, though in some specimens the quills were tipped with black; the legs are generally either black or of a grayish brown color; between the toes there is a membrane connected to the outer one as far as the second, and to the inner as far as the first joint. 'This bird,' says Latham, 'is found in various parts of the old continent, and from the Ferro Isles near Iceland to the Cape of Good Hope. It frequents the neighbourhood of the sea, and has been met with on the coasts of France and at Sevenhuys, near Leyden, in great plenty, annually breeding in a wood there. The nest is placed on high trees, near the sea-side. The female lays three or four white eggs, powdered with a few pale red spots, and of the size of those of a hen. They are very noisy during breeding time, like our rooks; are seldom found high up the rivers, chiefly frequenting the mouths of them. Their food is fish, which they often take from other birds, in the manner of the bald eagle; also mussels and other shell fish, being found in greatest numbers where these are plentiful; and they will also devour frogs and snakes, and even grass and weeds which grow in the water, as well as the roots of reeds. They are migratory, retiring to the warmer parts as the winter approaches, and are rarely seen in England. Their flesh is said to have the flavor of a goose, and is eaten by some, and the young birds have been thought good food. The two varieties of this species are equal in size to the roseate species. The bill of the first is reddish; the plumage mostly white; the feathers of the wings partly white and partly black, and the legs reddish. The plumage of the other is entirely white, not excepting even the quills. It has a crest of feathers whose webs are very loose, and separated from one another; the bill is of a rufous gray color, having red edges, and the legs are of a dull pale red. They both inhabit the Philippine Islands.

3. P. pigmea, the dwarf spoonbill, is about the size of a sparrow. The bill is black, longer than the head, flat at the end, and nearly of a rhomboidal form; the angles and top of the upper mandible are white, the tongue is smooth, the body is brown above and white beneath, the quills have white shafts, the tail is rounded, short, and of a brownish white color; the feet have four toes, are cloven, and the claws are pointed. It inhabits Surinam and Guiana.

PLATANE, *n. s.* Fr. *platane;* Lat. *platanus.* The plane tree.

The *platane* round,
The carver holm, the maple seldom inward sound.
Spenser.

I espied thee fair and tall,
Under a *platane*. *Milton.*

PLATANUS, the plane-tree, a genus of the polyandria order and monœcia class of plants, natural order fiftieth, amentaceæ. There are two species

1. P. occidentalis, occidental or western plane-tree, rises with a straight smooth stem to a great height, branching widely round. It has lobated leaves seven or eight inches long, and from nine or ten to twelve or fourteen broad, divided into three large lobes, with very small flowers, collected into round heads, succeeded by round rough balls of seeds. It is a native of Virginia and other parts of North America, where it attains an enormous size, and is remarkable for having its stem of an equal girth for a considerable length; some trees being eight or nine yards in circumference.

2. P. orientalis, oriental or eastern plane tree, rises with a very straight smooth branching stem to a great height. It has palmated leaves six or eight inches long and as broad, divided into five large segments, having the side ones cut into two smaller, green above, and pale underneath; and long pendulous pedunculi, each sustaining several round heads of close-sitting, very small flowers; succeeded by numerous downy seeds, collected into round, rough, hard balls. It is a native of Asia and many parts of the east, and grows in great plenty in the Levant. The varieties of these two species are the Spanish or middle plane tree, having remarkably large leaves of three or five narrower segments; and the maple-leaved plane tree, having smaller leaves, somewhat lobated into five segments, resembling the maple tree leaf. All these elegant trees are of a hardy temperature, so as to prosper here in any common soil and exposure in our open plantations, &c., and are some of the most desirable trees of the deciduous tribe. They were in singular esteem among the ancients of the east for their extraordinary beauty and the delightful shade they afforded by their noble foliage. The leaves commonly expand in May, and fall off early in autumn; and the flowers appear in spring, a little before the leaves, being succeeded by seeds, which in fine seasons frequently ripen here in September. These fine trees are singularly fitted for all ornamental plantations. Their straight growth, regular branching heads, and the lofty stature they attain, together with the extraordinary breadth of their luxuriant leaves, render them extremely desirable furniture to adorn avenues, lawns, parks, and woods; some disposed in ranges, some as single standards, others in clumps, some in groves, &c. The propagation of these trees is by seed, layers, and cuttings. The seeds frequently ripen in these parts, and are also procured from other countries, and may be

obtained of the nurserymen or seedsmen. The best season for sowing them is autumn, if they can be then procured. Choose a somewhat shady moist soil; and having dug the ground, and raked it fine, form it into four feet wide beds, and either scatter the seeds evenly on the surface, and rake them in, or previously with the back of a rake turn the earth off the surface nearly half an inch deep into the alleys; then sow the seed, and directly, with the rake turned the proper way, draw the earth evenly over the seeds, and trim the surface smooth; many of the plants will rise in spring, and some probably till the spring following. When they are one or two years old plant them out in nursery rows, two or three feet asunder, and about half that distance in the lines; to remain till of a proper size for final transplantation. The method of propagation by layers is commonly practised in the nurseries, in default of seed, and by it they most readily grow; for which purpose some stout plants for stools must be planted, which in a year after must be headed down near the bottom, that they may throw out many shoots near the ground, convenient for laying; which, in the autumn after they are produced, lie by for slit-laying, and by the autumn after will be well rooted, and form plants two or three feet high, so as to be separated, and planted in nursery rows like the seedlings. All the sorts will take tolerably by cutting off the strong young shoots; but the platanus occidentalis more freely than the oriental kind. Autumn is the best season; as soon as the leaf falls choose strong young shoots, and plant them in a moist soil; many of them will grow, and make tolerable plants by next autumn. To continue the distinction of the varieties more effectually, they should be propagated either by layers or cuttings; for, when raised from seed, those of the respective species generally vary.

PLATE, *n. s.* & *v. a.* Sax. plaꞇ; Fr. *plat;* Belg. *plate;* Gr. πλατυς. A piece of metal beat out flat or into breadth; armour of plates; wrought silver or gold; a broad shallow eating-dish or vessel; to cover or arm with plates; beat into laminæ.

The doors are curiously cut through and *plated.* *Sandys.*

With their force they pierced both *plate* and mail,
And made wide furrows in their fleshes frail. *Spenser.*

The Turks entered into the trenches so far that they carried away the *plate.* *Knolles's History.*

In his livery
Walked crowns and coronets; realms and islands were
As *plates* dropped from his pocket. *Shakspeare.*

Plate sin with gold,
And the strong lance of justice hurtless breaks. *Id.*

Marshal, ask yonder knight in arms,
Why *plated* in habiliments of war? *Id.*

Make a *plate,* and burnish it as they do iron. *Bacon.*

They eat on beds of silk and gold,
And leaving *plate,*
Do drink in stone of higher rate. *Ben Jonson's Catiline.*

A table stood,
Yet well wrought *plate* strove to conceal the wood. *Cowley.*

A leaden bullet shot from one of these guns, the space of twenty paces, will be beaten into a thin *plate.* *Wilkins.*

The bold Ascalonite
Fled from his lion ramp, old warriors turned
Their *plated* backs under his heel. *Milton.*

They that but now for honour and for *plate*
Made the sea blush with blood, resign their hate. *Waller.*

Eternal deities!
Who rule the world with absolute decrees,
And write whatever time shall bring to pass
With pens of adamant on *plates* of brass. *Dryden.*

If to fame alone thou dost pretend,
The miser will his empty palace lend,
Set wide his doors adorned with *plated* brass. *Id.*

Ascanius this observed, and, smiling, said,
See, we devour the *plates* on which we fed. *Id.*

At your dessert bright pewter comes too late,
When your first course was all served up in *plate.* *King.*

The censers of rebellious Korah, &c., were by God's mandate made *plates* for the covering of the holy altar. *White.*

The censers of these wretches who could derive no sanctity to them; yet in that they had been consecrated by the offering incense, were appointed to be beaten into broad *plates,* and fastened upon the altar. *South.*

If a thinned or *plated* body, of an uneven thickness, which appears all over of one uniform color, should be slit into threads of the same thickness with the *plate;* I see no reason why every thread should not keep its colour. *Newton.*

M. Lepidus's house had a marble door-case, afterwards they had gilded ones, or rather *plated* with gold. *Arbuthnot.*

What nature wants has an intrinsick weight,
All more is but the fashion of the *plate.* *Young.*

Plate is likewise used by sportsmen to express the reward given to the best horse at races; which was formerly often a piece of elegant silver plate, as a tea-pot, tea kitchen, caudle cup or punch bowl; but is now almost universally converted into a purse.

PLATFORM, *n. s.* Fr. *flat,* plat and form. The sketch of any thing horizontally delineated; ichnography; scheme; plan; flat place.

When the workmen began to lay the *platform* at Chalcedon, eagles conveyed their lines to the other side of the streight. *Sandys.*

Their minds and affections were universally bent even against all the orders and laws wherein this church is founded, conformable to the *platform* of Geneva. *Hooker.*

Where was this?
—Upon the *platform* where we watch. *Shakspeare.*

I have made a *platform* of a princely garden by precept, partly by drawing not a model, but some general lines of it. *Bacon's Essays.*

They who take in the entire *platform,* and see the chain, which runs through the whole, and can bear in mind the observations and proofs, will discern how these propositions flow from them. *Woodward.*

No artful wildness to perplex the scene;
Grove nods at grove, each alley has a brother,
And half the *platform* just reflects the other. *Pope.*

Platform, in the military art, is an elevation of earth, on which cannon are placed to fire on

the enemy; such are the mounts in the middle of curtains. On the ramparts there is always a platform, where the cannon are mounted. It is made by the heaping up of earth on the rampart, or by an arrangement of madriers, rising insensibly for the cannon to roll on, either in a casemate or on attack in the outworks. All practitioners are agreed that no shot can be depended on, unless the piece can be placed on a solid platform; for, if the platform shakes with the first impulse of the powder, the piece must likewise shake, which will alter its direction, and render the shot uncertain. They must be made higher behind than before by six or nine inches, to prevent too great a recoil, and to advance the gun easily when loaded. They are from eighteen to twenty feet long, eight feet before, and fourteen or fifteen feet behind, and the direction left to the officers of the royal regiment of artillery.

PLATFORM, or ORLOP, in a man of war, is a place on the lower deck, abaft the main mast, between it and the cock-pit, and round about the main capstan, where provision is made for the wounded men in time of action.

PLATINA (Bartholomew Sacchi), or Philip, as others call him, a learned Italian historian, born in 1421 at Piedena, a village between Cremona and Mantua. He first embraced a military life, but afterwards devoted himself to literature. He went to Rome under Calixtus III. about 1456; was introduced to cardinal Bessarion, obtained some benefices from Pius II., and was appointed apostolical abbreviator. Paul II. succeeding, abolished the offices of all the abbreviators. Platina complained to the pope, and requested to be judged by the auditors of the Rota. Paul gave him a haughty repulse, and finally put him in prison, where he suffered great hardships for four months, when he was liberated, but forbid to leave Rome. After this he was again imprisoned with many others, on suspicion of a plot, and put to the rack. The plot being found imaginary, he was next accused of heresy. Sixtus IV., succeeding Paul in 1467, appointed Platina keeper of the Vatican library, in which station he lived very happily till 1481, when he died of the plague. He was author of several works, of which the most famous is his History of the Popes.

PLATINA, or PLATINUM. See PLATINUM.

PLATING. See SILVER.

PLATINUM, or PLATINA, in chemistry, is the heaviest of the metals. The name was given it by the Spaniards from the word plata, signifying silver, by way of comparison with that metal, whose color it resembles, or from the river Plata, near which it is found. It is characterised by a silvery color, not tarnished by the air; it is very hard and tenacious, sonorous, exceedingly malleable and ductile, specific gravity 21·5, detonating with nitre; soluble only by boiling it in sixteen times its weight of nitro-muriatic acid, and giving the solution first a yellow and then a red-brown color; its oxide is precipitated from this solution by the addition of muriate of ammonia, in the form of an orange powder. It is found in the gray silver ore of Guadalcanal in Spain, in Choco, in New Granada, and in the province of Barbacoas. It is peculiar to an alluvial tract of 600 leagues, where it is associated with grains of native gold, zircon, spinel, quartz, and magnetic ironstone. It is not true that this metal occurs near Carthagena, or Santa Fé, or in the islands of Porto Rico and Barbadoes, or in Peru, although these different localities have been mentioned by authors. The gray copper ore of Guadalcanal in Spain contains from one to ten per cent of platina. A Negro slave in the gold mines of Condoto, in the government of Choco, in South America, found a mass of platina of extraordinary magnitude, and which is now deposited in the royal museum, in Madrid. It weighs rather more than 1½ lb., and is the largest piece of this metal hitherto met with. The large specimen brought from America by Humboldt, and deposited in the king's cabinet in Berlin, and which weighs 1085 grains, was also found in Choco. These facts allow us to hope that platina may be found in its original repository somewhere in that country. It was unknown in Europe before the year 1748. Don Antonio Ulloa then gave the first intimation concerning its existence, in the narrative of his voyage with the French academicians to Peru.

Its ore has been found to contain likewise four new metals—PALLADIUM, IRIDIUM, OSMIUM, and RHODIUM, which see; beside iron and chrome. The crude platina is to be dissolved in nitro-muriatic acid, precipitated by muriate of ammonia, and exposed to a very violent heat. Then the acid and alkali are expelled, and the metal reduced in an agglutinated state, which is rendered more compact by pressure while red-hot.

Pure or refined platina is by much the heaviest body in nature. It is very malleable, though considerably harder than either gold or silver; and it hardens much under the hammer. Its color on the touch-stone is not distinguishable from that of silver. Pure platina requires a very strong heat to melt it; but, when urged by a white heat, its parts will adhere together by hammering. This property, which is distinguished by the name of welding, is peculiar to platina and iron, which resemble each other likewise in their infusibility.

Platina is not altered by exposure to air; neither is it acted upon by the most concentrated simple acids, even when boiling, or distilled from it. The aqua regia best adapted to the solution of platina is composed of one part of the nitric and three of the muriatic acid. The solution does not take place with rapidity. A small quantity of nitric oxide is disengaged, the color of the fluid becoming first yellow, and afterwards of a deep reddish-brown, which, upon dilution with water, is found to be an intense yellow. This solution is very corrosive, and tinges animal matters of a blackish-brown color: it affords crystals by evaporation.

Count Moussin Poushkin has given the following method of preparing malleable platina:—Precipitate the platina from its solution by muriate of ammonia, and wash the precipitate with a little cold water. Reduce it in a convenient crucible to the well-known spongy metallic texture, which wash two or three times with boiling water, to carry off any portion of saline matter that

may have escaped the action of the fire. Boil it for about half an hour in as much water, mixed with one-tenth part of muriatic acid, as will cover the mass to the depth of about half an inch, in a convenient glass vessel. This will carry off any quantity of iron that might still exist in the metal. Decant the acid water, and edulcorate, or strongly ignite the platina. To one part of this metal take two parts of mercury, and amalgamate in a glass or porphyry mortar. This amalgamation takes place very readily. The proper method of conducting it is to take about two drachms of mercury to three drachms of platina, and amalgamate them together; and to this amalgam may be added alternate small quantities of platina and mercury, till the whole of the two metals is combined. Several pounds may be thus amalgamated in a few hours, and in the large way a proper mill might shorten the operation. As soon as the amalgam of mercury is made, compress it in tubes of wood, by the pressure of an iron screw upon a cylinder of wood adapted to the bore of the tube. This forces the superabundant mercury from the amalgam, and renders it solid. After two or three hours, burn upon the coals, or in a crucible lined with charcoal, the sheath in which the amalgam is contained, and urge the fire to a white heat; after which the platina may be taken out in a very solid state, fit to be forged. Muriate of tin is so delicate a test of platina, that a single drop of the recent solution of tin in muriatic acid gives a bright red color to a soluti n of muriate of platina, scarcely distinguishable from water.

If the muriatic solution of platina be agitated with ether, the ether will become impregnated with the metal. This ethereal solution is of a fine pale yellow, does not stain the skin, and is precipitable by ammonia. If the nitro-muriatic solution of platina be precipitated by lime, and the precipitate digested in sulphuric acid, a sulphate of platinum will be formed. A subnitrate may be formed in the same manner.

Platinum does not combine with sulphur directly, but is soluble by the alkaline sulphurets, and precipitated from its nitro-muriatic solution by sulphureted hydrogen. Pelletier united it with phosphorus, by projecting small bits of phosphorus on the metal heated to redness in a crucible; or exposing to a strong heat four parts each of platinum and concrete phosphoric acid with one of charcoal powder. The phosphuret of platinum is of a silvery-white, very brittle, and hard enough to strike fire with steel. It is more fusible than the metal itself, and a strong heat expels the phosphorus, whence Pelletier attempted to obtain pure platinum in this way. He found, however, that the last portions of phosphorus were expelled with too much difficulty.

Platinum unites with most other metals. Added in the proportion of one-twelfth to gold, it forms a yellowish-white metal, highly ductile, and tolerably elastic, so that Mr. Hatchett supposed it might be used with advantage for watch-springs, and other purposes. Its specific gravity was 19·013.

Platinum renders silver more hard, but its color more dull. Copper is much improved by alloying with platinum. From one-sixth to one-twenty-fifth, or even less, renders it of a golden color, harder, susceptible of a finer polish, smooth-grained, and much less liable to rust. Alloys of platinum with tin and lead are very apt to tarnish. For its important combinations with iron and steel, see STEEL. The following remarks of Mr. Murray on an easy method of forming alloys of platinum may not be unacceptable:—

'While operating on antimony,' says Mr. M., 'I had placed a small button of that metal in a platinum spoon, and introduced it into the flame of a spirit lamp. The antimony had scarcely attained fusion, when the platinum spoon, together with it, ran into a uniform brittle mass, and fell in vivid combustion on the glass lamp, which was consequently fractured. The effect in question is better exhibited by wrapping up a bit of antimony in platinum foil, and holding it by a pair of forceps in the alcoholic flame, when a beautiful ignition shortly commences, and the glowing mass falls to the ground. Fragments of grained tin, arsenic, lead, bismuth, &c., folded up in platinum-foil, exhibited at the instant of fusion and combination very brilliant and beautiful phenomena; but the finest effect certainly was that of zinc and platinum-foil, when the fused mass emitted an intense light of a blue color. Alloys of tin and arsenic, bismuth and lead, &c., were in like manner subjected to experiment. Laminated gold, silver, and copper, proto-carburet, and per-carburet of iron, pinchbeck, &c., were rolled up in platinum-foil, and introduced into the flame, but without any particular result. Remarkable and beautiful, however, were the phænomena which appeared, when some metallic wires were brought in contact with platinum wire at a white heat in this flame. Gold, silver, and copper wires were those used. They fused in the flame, and, when brought in contact with the platinum wire, severally produced minute adhering balls, which, repeated with narrow intervals between, appeared ultimately like little glowing beads threaded on a string. These united with the platinum, and burned with very delicate scintillation; and, when the wire was inclined, the beads ran along the metallic string, combining with successive films of the wire, until the latter became as fine as the almost airy thread of the gossamer. The gold, silver, and copper wires, per se, entered into tranquil. fusion, and did not scintillate. When zinc is carried along the platinum wire, the ends or streams of a fine blue flame ascend from it, and, when the bead rather exceeds in size, jets of a similar colored flame issue, accompanied sometimes with slight explosion.'

Platinum, antimony, charcoal (fine levigated, from the betel-nut) and silica, when alloyed in a somewhat similar manner, gave a button impressed with difficulty by the knife, and granular. Crushed in a steel-mortar, it was reduced to powder, the particles of which were very brilliant.

Platinum, silica, and antimony, nearly similar. Parts capable of imperfect extension by the hammer; and sometimes on the edge so hard

(perhaps from an imperfect combination of the silica) as to scratch glass; less bright than the preceding alloy.

Platinum, antimony, and zirconia. The ignition here was extremely beautiful, and the fusion of the whole was more complete than any tried. It was crushed by the steel-mortar, and presented brilliant facets. The fused globules were exteriorly spotted with very minute and sparkling crystalline points. This alloy was less silvery and brilliant than that with silica and charcoal.

Glucina, platinum, and antimony,—had a color not unlike a specimen of native nickel from Hesse, or intermediate between pure nickel and refined silver. Scarcely abraded by the knife. Crushed in the steel-mortar, it was less granular and angular in its particles than the preceding.

Alumina, antimony, and platinum, very much resembled the former, but a shade darker in color.

The alloy with silica, charcoal, potassium, antimony, and platinum; and that with zirconia, potassium, &c., seemed to differ little from those without potassium. The potassium burns before the fusion of the alloy takes place, and, perforating the platinum-foil, escapes in the character of flame, so that it would only preserve the reduction of the earthy oxide.

The combination of zinc, platinum, and protoxide of barium was ragged, scoriaceous, and very hard.

From its hardness, infusibilty, and difficulty of being acted upon by most agents, platinum is of great value for making various chemical vessels. These have, it is true, the inconvenience of being liable to erosion from the caustic alkalies and some of the neutral salts.

Platinum is now hammered in Paris into leaves of extreme thinness. By enclosing a wire of it in a little tube of silver, and drawing this through a steel plate in the usual way, Dr. Wollaston has succeeded in producing platinum wire not exceeding $\frac{1}{3000}$th of an inch in diameter.

According to Mr. E. Davy, there are two phosphurets and three sulphurets of platinum. See his excellent memoir in the Philosophical Magazine, vol. xl.

The salts of platinum have the following general characters:—

1. Their solution in water is yellowish-brown.
2. Potash and ammonia determine the formation of small orange-colored crystals.
3. Sulphureted hydrogen throws down the metal in a black powder

Ferroprussiate of potash, and infusion of galls, occasion no precipitate.

1. The sulphate of platinum may be obtained by passing a current of sulphureted hydrogen gas through the nitro-muriatic solution. It should be washed and boiled once or twice with nitric acid, to ensure its entire conversion into sulphate. It has a brownish-black color, and resembles the carbonaceous crust left when sugar is decomposed by heat. It is brittle, easily pulverised, and has the lustre nearly of crystallised blende. Its taste is acid, metallic, and somewhat caustic. It reddens litmus paper slightly. It is deliquescent, and soluble in water, alcohol, and ether, as well as in muriatic, nitric, and phosphoric acids. At a red heat it is resolved into metal.

The suboxide of platina and the oxide of the sulphuret of platina absorb whatever combustible gas is brought into contact with them, but they do not absorb either oxygen or carbonic acid gas. 100 grains of the suboxide of platina absorb from fifteen to twenty cubic inches of hydrogen gas; and, during this process, so great a quantity of heat is developed, that the metallic substance becomes red-hot, and the hydrogen gas detonates, if previously mixed with atmospheric air, or with oxygen gas. The platina thus charged with hydrogen greedily absorbs a portion of oxygen, as much as will suffice for the formation of water; if brought in contact with less than the portion of atmospheric air required for this purpose, the hydrogen combines with part of the azote, and forms ammonia. During this process the platina is perfectly reduced to a metallic state, and loses the property of decomposing alcohol.

The following is a beautiful experiment for exhibiting the action of powder of platina upon hydrogen gas. Put the powder of platina into a glass-funnel, closed at its lower extremity. Introduce from above a current of hydrogen gas through a capillary tube, the end of which must be distant from one to two inches from the platina, in order to have the hydrogen gas mixed with atmospheric air, before it comes into contact with the metal. The dust of platina almost instantaneously becomes first red, then white-hot, and continues in this state as long as there is any hydrogen gas acting upon it. If introduced in a quantity sufficiently considerable the gas itself will be inflamed.

M. Dobereiner has since endeavoured to deduce a eudiometrical process from this singular property of platina. He mixes the pulverised platinum with a little clay, and, having formed it into a mass of the consistency of paste, he converts it into small balls of the size of a pea. He then dries them, and makes them red-hot with the blowpipe, in order to give them solidity. He now introduces one of these balls into a tube of glass, shut up above, and resting on a trough of mercury, and containing two volumes of hydrogen gas and one of oxygen. The mixture of these two gases forms water in a few seconds. One of these balls may serve for a hundred experiments, provided it is dried in the air after each experiment.

Fulminating platinum has been lately discovered by Mr. Edmund Davy. Into a solution of the sulphate in water aqueous ammonia is poured, and the precipitate which falls, being washed, is put into a matrass with potash-ley, and boiled for some time. It is then filtered, washed, and dried. A brown powder is obtained, lighter than fulminating gold, which is the fulminating platinum. It explodes violently when heated to 400°; but does not detonate by friction or percussion.

PLATO, an illustrious philosopher of antiquity, who was by descent an Athenian, though the place of his birth was the island of Ægina. His descent by his father was from Codrus the

last king of Athens and by his mother from Solon the celebrated legislator. The time of his birth is placed in the beginning of the eighty-eighth Olympiad; but Dr. Enfield thinks it may be more accurately fixed in the third year of the eighty-seventh Olympiad, or 430 years before the Christian era. He gave early indications of an extensive and original genius, and had an education suitable to his high rank, being instructed in the rudiments of literature by the grammarian Dionysius, and trained in athletic exercises by Aristo of Argos. He applied with great diligence to the arts of painting and poetry; and wrote an epic poem, which, upon comparing it with Homer, he burnt. He next wrote a dramatic piece, which was to have been acted; but, happening to attend upon a discourse of Socrates, he was so captivated by his eloquence that he reclaimed his tragedy, renounced the muses, burnt all his poems, and applied himself wholly to the study of philosophy. It is said that Plato's first masters in philosophy were Cratylus and Hermogenes, who taught the systems of Heraclitus and Parmenides; but when he was twenty years old he attached himself wholly to Socrates, with whom he remained eight years as a scholar. During this period he frequently displeased his companions, and sometimes even his master, by grafting upon the Socratic system doctrines which were taken from some other stock. Plato, however, retained the warmest attachment to his master. When Socrates was summoned before the senate, his illustrious scholar undertook to plead his cause, and began a speech in his defence; but the judges would not permit him to proceed. After the condemnation, he presented his master with money sufficient to redeem his life; which, however, Socrates refused to accept. During his imprisonment Plato attended him, and was present at a conversation which he held with his friends concerning the immortality of the soul; the substance of which he afterwards committed to writing in the beautiful dialogue entitled Phædo. The philosophers at Athens were so alarmed at the death of Socrates that most of them fled from the city. Plato, whose grief upon this occasion is said by Plutarch to have been excessive, retired to Megara; where he was kindly entertained by Euclid, who had been one of Socrates's first scholars, till the storm was over. He afterwards travelled in pursuit of knowledge; and from Megara went to Italy, where he conferred with Eurytus, Philolaus, and Archytas, the most celebrated of the followers of Pythagoras, whose doctrine was then become famous in Greece; and from these the Pythagoreans have affirmed that he received all his natural philosophy. He next went to Cyrene, where he studied geometry under Theodorus the mathematician. Thence he passed into Egypt, to acquire their theology, to study more nicely the proportions of geometry, and to instruct himself in astronomical observations; and, having taken a full survey of the country, he settled for some time in the province of Sais, learning of the wise men there their opinions concerning the universe; and Pausanias affirms that he learned from these the immortality and transmigration of souls. He next travelled into Persia to consult the magi on the religion of that country. He then returned into Italy, to the Pythagorean school at Tarentum, where he endeavoured to improve his own system, by incorporating with it some of the doctrines of Pythagoras, then taught by Archytas, Timæus, and others. And afterwards, when he visited Sicily, he retained such an attachment to the Italic school, that, through the bounty of Dionysius, he purchased at a vast price several books which contained the doctrines of Pythagoras, from Philolaus, one of his followers. Returning home, richly stored with knowledge of various kinds, Plato settled at Athens, and formed a new school for the instruction of youth in philosophy, in the academy. This new school soon became famous, and its master was ranked among the most eminent philosophers. People of the first distinction in every department frequented the academy; and even females disguised often attended his lectures. Among the illustrious names which appear in the catalogue of his followers are Dion the Syracusan prince, and the orators Hyperides, Lycurgus, Demosthenes, and Isocrates. The distinguished reputation of Plato brought upon him the envy of his former companions in the school of Socrates, and they loaded him with detraction and obliquy. From this spirit Xenophon and Plato, though they relate the discourses of their common master, avoid mentioning one another. Diogenes the Cynic ridiculed Plato's doctrine of ideas. In the midst of these private censures, however, the public fame of Plato daily increased: and several states, among which were the Arcadians and Thebans, sent ambassadors with earnest requests that he would come over, not only to instruct the young men in philosophy, but also to prescribe them laws of government. The Cyrenians, Syracusans, Cretans, and Eleans, sent also to him: he did not, however, visit any of them, but sent laws and rules of government to all. He was a man of great virtues, and exceedingly affable. Diogenes, piqued at the taste and elegance of Plato, took every opportunity of attacking him. He dined one day at his table with other company, and, trampling upon the tapestry with his dirty feet, said, 'I trample upon the pride of Plato;' to which Plato cleverly replied, 'With greater pride.' The admiration of this illustrious man was not confined to a few philosophers. He was greatly esteemed by several princes, particularly Archelaus king of Macedon, and Dionysius, tyrant of Sicily. At three different periods he visited the court of this latter prince, and made several bold but unsuccessful attempts to subdue his haughty spirit. The professed object, says Dr. Enfield in his History of Philosophy, of Plato's first visit to Sicily, which happened in the fortieth year of his age, during the reign of the elder Dionysius, the son of Hermocrates, was to take a survey of the island, and particularly of Mount Ætna. Whilst he resided at Syracuse he was employed in the instruction of Dion, the king's brother-in-law, who possessed excellent abilities, though hitherto restrained by a tyrannical government, and relaxed by the luxuries of a licentious court. Disgusted by the debaucheries of the Syracusans, Plato endeavoured to rescue his pupil from the general de-

pravity. Nor did Dion disappoint his hopes; and, hoping that philosophy might produce the same effect upon Dionysius, he procured an interview with him. During the conference, whilst Plato discoursed on the happiness of virtue, and the miseries attending injustice and oppression, Dionysius took offence, dismissed him with displeasure, and even formed a design against his life. It was not without difficulty that Plato escaped. A vessel which had brought over Pollis, a delegate from Sparta, was fortunately then returning to Greece. Dion engaged Pollis to land Plato safely in his native country; but Dionysius discovered the design, and made Pollis promise that he would either put him to death or sell him as a slave. Pollis accordingly sold him in his native island of Ægina. Anicerris, a Cyrenaic philosopher, discovered the stranger, and purchased his freedom for thirty minæ (£84 10*s.* sterling), and sent him home to Athens. Repayment being afterwards offered to Anicerris by Plato's relations, he refused the money, saying, with that generous spirit which true philosophy inspires, that he saw no reason why the relations of Plato should engross to themselves the honor of serving him. After a short interval Dionysius repented of his unjust resentment, and wrote to Plato, requesting him to return to Syracuse, and to forget his former tyrannous behaviour; to which request Plato returned this high-spirited answer, that philosophy would not allow him leisure to think of Dionysius. He was, however, prevailed upon by Dion to return to Syracuse, and take upon him the education of Dionysius the younger, the heir apparent. He was received by Dionysius I. with every possible respect; but after seeing his friend banished, and being himself kept as a kind of prisoner at large in the palace, he was by the tyrant sent back into his own country, with a promise that both he and Dion should be recalled at the end of the war in which the Sicilians were then engaged. This promise was not fulfilled. The tyrant wished for the return of Plato, but could not resolve to recal Dion. At last, however, he prevailed upon Plato to visit that capital a third time. When he arrived, the king met him in a magnificent chariot, and conducted him to his palace. The Sicilians too rejoiced in his return; for they hoped that the wisdom of Plato would at length triumph over the tyrannical spirit of the prince. Dionysius seemed wholly divested of his former resentments, listened with apparent pleasure to the philosopher's doctrine, and among other expressions of regard presented him with eighty talents of gold. In the midst of a numerous train of philosophers Plato now possessed the chief influence and authority in the court of Syracuse. Whilst Aristippus was enjoying himself in splendid luxury; whilst Diogenes was freely indulging his acrimonious humor; and whilst Æschines was gratifying his thirst after riches; Plato supported the credit of philosophy with an air of dignity which his friends regarded as an indication of superior wisdom, but which his enemies imputed to pride. After all, Plato could not prevail upon Dionysius to alter his system of policy, or to recal Dion from exile. At length Plato requested permission to return to Greece, which was granted him after some delay, and he was sent home loaded with rich presents. On his way to Athens, passing through Elis during the celebration of the Olympic games, he was present at this general assembly of the Greeks, and engaged universal attention. Plato now devoted himself to science, and spent the last years of a long life in the instruction of youth. Having enjoyed the advantage of an athletic constitution, he arrived at the eighty-first year of his age, and died in the first year of the 108th Olympiad. He passed his whole life in a state of celibacy, and therefore left no natural heirs, but transferred his effects, by will, to his friend Adiamantus. The grove and garden which had been the scene of his philosophical labors at last afforded him a sepulchre. Statues and altars were erected to his memory; the day of his birth long continued to be celebrated as a festival by his followers; and his portrait is to this day preserved in gems; but the most lasting monuments of his genius are his writings, which have been transmitted, without material injury, to the present times. The ancients thought more highly of Plato than of all their philosophers: they always called him the Divine Plato; and they resolved that his descent should be more than human, for Apuleius mentions a common report, 'that his mother Perictione, who was a very beautiful woman, was impregnated by Apollo in the shape of a spectre.' Plutarch, Suidas, and others, affirm this to have been the common report at Athens. When he was an infant, his father Aristo went to Hymettus, with his wife and child, to sacrifice to the Muses; and, while they were busied in the rites, a swarm of bees came and distilled their honey upon his lips. This, says Cicero, was considered as a presage of his future eloquence. The writings of Plato are all in the form of dialogue; where he seems to deliver nothing from himself, but every thing as the sentiments and opinions of others, of Socrates chiefly, of Timæus, &c. His style, as Aristotle observed is betwixt prose and verse: on which account some have not scrupled to rank him with the poets. The first edition of Plato's works in Greek was published by Aldus at Venice in 1513; but a Latin version by Marsilius Ficinus had been printed there in 1491. They were reprinted together at Lyons in 1588, and at Frankfort in 1602. Henry Stephens, in 1578, gave a most beautiful and correct edition of Plato's works at Paris, with a new Latin version by Serranus, in 3 vols. folio. An elegant and correct edition after the Greek text of Henry Stephens, and the Latin version of Ficinus, was published at Deux Ponts, 1788, 12 vols. 8vo. English versions of Plato's Dialogues have been published at various periods; but the best is that of Floyer Sydenham, 1767-8, 4 vols. 4to., the whole of which have been republished, with the additional works of Plato, by Thomas Taylor, with copious notes, 5 vols. 4to.

PLATOFF, or PLATOW, a late hetman of the Cossacks, was born in South Russia, about 1763, and in 1806 and 1807 had the rank of lieutenant general in the army sent to the assistance of Prussia. He was afterwards employed against

the Turks in Moldavia, and became a general of cavalry. When the French invaded Russia, in 1812, Platoff was defeated at Grodno and obliged to retire; but he returned during the retreat of the enemy, and with twenty regiments of Cossacks harassed them much in their flight. In 1813, after the battle of Leipsic, he entered France, and was at Paris with the emperor Alexander, with whom he came to England, and was the object of much popular admiration. In 1815 he commanded the Cossacks destined for the second invasion of France. After the peace he retired to Tcherkash, where he died in February 1818.

PLATONISM, the philosophy of Plato, which was divided into three branches, theology, physics, and mathematics. Under theology were comprehended metaphysics and ethics, or that which, in modern language, is called moral philosophy. Plato wrote likewise on dialectics, but with such inferiority to his pupil Aristotle that his works in that department of science are seldom mentioned. The ancient philosophers always began their theological systems with disquisitions on the nature of the gods, and the formation of the world; and it was a fundamental doctrine with them, that from nothing nothing can proceed. They believed that a proper creation is improper even to Omnipotence, and that to the production of any thing a material is not less necessary than an efficient cause. That, with respect to this important question, Plato agreed with his predecessors and contemporaries appears evident from the whole tenor of his Timæus. We agree with Dr. Enfield in thinking that in this dialogue, which comprehends his whole doctrine on the formation of the universe, matter is so manifestly spoken of as eternally co-existing with God, that this part of his doctrine could not have been mistaken by so many learned and able writers had they not been seduced by the desire of establishing a coincidence of doctrine between the writings of Plato and Moses. It is certain that neither Cicero, Apuleius, Alcinous, nor even Chalcidius, understood Plato in any other sense than as admitting two primary and incorruptible principles, God and matter; to which we have reason to add a third, namely ideas. The passages quoted, by those who maintain the contrary opinion, by no means answer their purpose. Plato indeed calls God the parent of the universe, and speaks of him as 'forming animate and inanimate things, which did not before exist:' but these expressions do not imply that this offspring of Deity was produced from nothing, or that no prior matter existed from which they were formed. Through the whole Timæus Plato supposes two eternal and independent causes of all beings; one that by which all things are made, which is God; the other that from which all things are made, which is matter. He distinguishes between God, matter, and the universe, and supposes the Architect of the world to have formed it out of a mass of pre-existent matter. Matter, according to Plato, is an eternal and infinite principle. His doctrine on this head is thus explained by Cicero:—'Matter, from which all things are produced and formed, is a substance without form or quality, but capable of receiving all forms, and undergoing every kind of change; in which, however, it never suffers annihilation, but merely a solution of its parts, which are in their nature infinitely divisible, and move in portions of space which are also infinitely divisible. When that principle which we called quality is moved, and acts upon matter, it undergoes an entire change, and those forms are produced from which arises the diversified and coherent system of the universe.' Plato also insists upon the notion that matter has originally no form, but is capable of receiving any. He calls it the mother and receptacle of forms, by the union of which with matter the universe becomes perceptible to the senses; and maintains that the visible world owes its form to the energy of the divine intellectual nature. Our author is supported, in drawing this inference, by the testimony of Diogenes Laertius; yet the learned Dr. Ogilvie has expressed great surprise that any one should consider matter as having been, in Plato's opinion, uncreated; and he affirms that Laertius, instead of asserting that spirit and matter were the principles of all things, ought to have said that God alone, in Plato's estimation, was their original. To prove this, he gives from the Timæus a quotation, in which Plato declares that God framed heaven and earth, and the inferior deities; and that as he fashioned, so he pervades all nature. He observes that Cicero denominates the God of Plato the maker, and the God of Aristotle only the governor of the world. And, to satisfy those who demand a proof of Plato's having taught a real creation, he affirms that his writings abound with declarations on the subject, of which the meaning cannot be misapprehended. But the declarations of Plato on this subject appear by no means explicit; and the inference which Dr. Ogilvie draws from the words of Cicero seems not to flow necessarily from the sense of those words. That Plato believed God to have framed the heaven and the earth, and to have fashioned all nature, is a position which has never been controverted; but between framing or fashioning the chaos, and calling the universe into existence from non entity, there is an infinite and an obvious difference. The distinction made by Cicero between the God of Plato and the God of Aristotle is just, but it will not bear the superstructure which Dr. Ogilvie builds upon it. Aristotle maintained the eternity of the world in its present form. Plato taught that the first matter was in time reduced from a chaotic state into form by the power of the Demiurgus; but nothing in his writings declares his belief that the first matter was itself created. The learned Cudworth, who endeavoured, like Dr. Ogilvie, to show a coincidence of doctrine between the theology of Plato and that of the Gospel, gives a number of quotations in support of his position; of which we shall here insert only those two upon which Dr. Ogilvie seems to lay the greatest stress. Plato, says he, calls the one God, 'He that makes earth, and heaven, and the gods, and doth all things both in heaven, and hell, and under the earth.' And again, 'He by whose efficiency the things of the world were afterwards made, when they were not before.' Both Cud-

worth and Ogilvie think this last sentence an explicit declaration of Plato's belief in the creative power of God: but that they are mistaken has been evinced by Mosheim with a force of argument which will admit of no reply. Mosheim thinks that Cudworth was misled by too implicit a confidence in Ficinus; and it is not impossible that Dr. Ogilvie may have been swayed by the authority of Cudworth. That intellect existed antecedent to all bodies is indeed a Platonic dogma, from which Dr. Ogilvie, after Cudworth, wishes to infer that the doctrine of the creation was taught in the academy; but Plato, with every other Greek philosopher, distinguished between body and matter: and, though he held the priority of intellect to the former, it by no means follows that he believed it to have existed antecedent to the latter. That he believed mind, or rather soul (for he distinguishes between the two), to be the cause or principle of motion, cannot be denied; but we are not therefore authorised to conclude that he likewise believed it to be the cause of the existence of matter. That he believed mind to be the most ancient of all things, taking the word things in the most absolute sense, cannot be true, since, by Dr. Ogilvie's own acknowledgment, he held the existence and eternity of ideas: not to add that he believed *το εν* or *το αγαθον*, the first hypostasis in his trinity, to be superior to mind and prior to it, though not in time, yet in the order of nature. When, therefore, he calls mind the most ancient of all things, he must be supposed to mean only that it is more ancient than all bodies and inferior souls. In the Platonic cosmogony, we cannot, therefore, doubt, but that the eternity of the *υλη πρωτη* was taken for granted. But Plato did not believe it to have a single form or quality which it did not receive either from the demiurgus, or the psyche—the second or third person of his trinity. Except Aristotle, all the Greek philosophers, who were not materialists, held nearly the same opinions respecting the origin of the world; so that, in examining their systems, we shall be greatly misled if we understand the terms incorporeal and immaterial as at all synonymous. It was also a doctrine of Plato that there is in matter a necessary, but blind and refractory force; and that hence arises a propensity in matter to disorder and deformity, which is the cause of all the imperfection which appears in the works of God, and the origin of evil. On this subject Plato writes with wonderful obscurity, but he appears to have thought that matter, from its nature, resists the will of the Supreme Artificer, so that he cannot perfectly execute his designs: and that this is the cause of the mixture of good and evil in the material world. Plato, however, was no materialist. He taught that there is an intelligent cause, which is the origin of all spiritual being, and the former of the material world. The nature of this great being he pronounced it difficult to discover. The existence of God he inferred from the marks of intelligence which appear in the form and arrangement of bodies in the visible world: and, from the unity of the material system, he concluded that the mind by which it was formed must be one. God, according to Plato, is the supreme intelligence, incorporeal, without beginning, end, or change, and capable of being perceived only by the mind. His notions of God are indeed exceedingly refined, and such as it is difficult to suppose that he could ever have acquired but from some obscure remains of primeval tradition. In the Divine Nature he believed that there are two, and probably three, hypostases, whom he called *το ον* and *το εν*, *νους* and *ψυχη*. The first he considered as self-existent, and elevated far above all mind and all knowledge; calling him, by way of eminence, the being, or the one. The only attribute which he acknowledged in this person was goodness; and therefore he frequently styles him *το αγαθον*--the good, or essential goodness. The second he considered as mind, the wisdom or reason of the first, and the maker of the world; and therefore he styles him *νους*, *λογος*, and *δημιουργος*. The third he always speaks of as the soul of the world; and hence calls him *ψυχη*, or *ψυχη του κοσμου*. He taught that the second is a necessary emanation from the first, and the third from the second, or perhaps from the first and second. Plato often asserts, as superior to the self-moving principle, an immoveable *νους*, or intellect, which was properly the demiurgus, or framer of the world; and above this hypostasis one most simple and absolutely perfect being, who is considered, in his theology, as *αυτοθεος*, the original deity, in contradistinction from the others, who are only *θεοι εκ θεου*. These doctrines are to be gathered from his works at large, particularly from his Timæus, Philebus, Sophista, and Epinomis; but there is a passage in his second epistle to Dionysius, in answer to a letter in which that monarch had required him to give a more explicit account of the nature of God. In treating of the eternal emanation of the second and third hypostases from the first, the philosophers of the academy compare them to light and heat proceeding from the sun. Plato himself, as quoted by Dr. Cudworth, illustrates his doctrine by the same comparison. It is not, however, certain, that Plato considered his *ψυχη του κοσμου* as a pure spirit, or as having subsisted from eternity as a distinct hypostasis. 'This governing spirit, of whom the earth, properly so called, is the body, consisted, according to him, of the first matter, and of pure intelligence, framed to actuate the machinery of nature. The Supreme Being placed him in the middle of the earth; which, in the vivid idea of Plato, seemed itself to live, in consequence of an influence that was felt in every part of it. From this seat his power is represented as being extended on all sides to the utmost limit of the heavens; conferring life, and preserving harmony in the various and complicated parts of the universe. Upon this being God looked with peculiar complacency after having formed him as an image of himself, and gave beauty and perfect proportion to the mansion which he was destined to occupy. The Supreme Being struck out from this original mind innumerable spirits of inferior order, endowed with principles of reason; and he committed to divinities of secondary rank the task of investing these in material forms, and of dispersing them as inhabitants of the sun, moon, and

other celestial bodies. He taught also, that at death the human soul is reunited to the ψυχη του κοσμου, as to the source from which it originally came.' Such is the third person of the Platonic triad, as we find his nature and attributes accurately stated by Dr. Ogilvie. That his doctrine on this subject should be inaccurate and erroneous can excite no wonder; whilst it must be confessed to have such a resemblance to the truth, and to be so incapable of being proved by reasoning from effects to causes, that we could not doubt of his having inherited it by tradition, even though we had not complete evidence that something very similar to it was taught long before him, not only by Pythagoras and Parmenides, but by the philosophers of the east. In Plato's cosmogony there is another principle, more mysterious if possible than any thing yet mentioned. This is his intellectual system of ideas, which, it is not easy to collect from his writings, whether he considered as independent existences, or only as archetypal forms, which had subsisted from eternity in the λογος or divine intellect. On this subject he writes with such exceeding obscurity that men of the first eminence, both among the ancients and the moderns, have differed about his real meaning.

The following is an abstract of Plato's physiological creed: it is cautiously expressed, for the philosopher lived and wrote among a people nursed in ignorance, intoxicated with power, and jealous of their national superstitions.

Speech, says he, should bear some proportion to the subjects described; but, as no words can fully express their essence or reach their substance and internal nature, we must be content if we can deliver some likeness or image that may convey a shadow or semblance of the truth. If, therefore, my friend! of the numberless doctrines which many have advanced concerning the nature of the gods and the creation of the world, we are not able to make out an exact and consistent scheme, you must not be surprised, but be pleased if we can reach a probable one; remembering that both I who speak and you who hear and judge have no divine but an imperfect human nature: it, therefore, becomes us, upon such high subjects, to rest satisfied with probable accounts, without captious enquiry into the matter. Let us then declare for what reason the Author of Being and Creator of the World at first composed the wondrous frame.

He is good; and envy or ill-will is in no respect incident to the good. Exempt from these it was His will that all things should be made as like himself as possible. With this intention, find ng all visible matter not in a state of rest, but tossed to and fro in a wild irregular motion, He first brought order out of confusion as the preferable state; for it was and is utterly impossible that the best of beings should produce any thing, and that thing be not the best and fairest, of which the materials will admit. Wherefore contemplating, He saw that even among material objects, nothing void of thought, could, in whole or in part, ever compare for excellency with what was possessed of intelligence; and then, that it was impossible that thought should reside in any substance but in mind and spirit. He, therefore, endowed a mind with intelligence, and, conjoining that mind to the immense material frame, finished the mighty work, the fabric of the world, with the highest beauty and perfection of which it was capable. Thus, in a probable way of reasoning, we must needs conclude that the universe is in truth, animated thinking substance, so formed by the fore-knowledge of God.

Plato then proceeds to give an account of the composition of the elements, the formation of the heavens, the spherical figure of the universe, and of the harmonious proportions concurring in the production of the immaterial thinking substance which animates the whole. This, as its father who begat it, being perceived to be self-moved, and self-subsistent, and the image of the eternal God, He approved, and was glad, and went on to liken it still more to the original model. Wherefore, as it is an eternal animated substance, He resolved to render the whole creation, as far as possible, the same: but, since the nature of an immortal substance cannot be perfectly adapted to generated matter, the great Architect contrived a certain moving semblance of endless duration. Having, therefore, put the heavens in order,—duration or eternity continuing the self-same individual thing,—He framed a progressive imitation of it, perpetually increasing by number and quantity, which men call time: for days, and nights, and months, and years, did not exist, until the heavens were made, and were by him ordained to co-exist with the heavens, how soon they were set in motion. It is true that men, when they speak of past and future, improperly and inadvertently apply these parts of created time to eternal duration. In sound reason, however, we can with propriety only say of the latter, that *it is;* while *it was* and *it will be* should be solely applied to progressive existence, advancing step by step in time. The expressions *it was* and *it will be* denote successive movements; but the other, *eternal duration or existence*, is for ever the same, indivisible, immovable, without possibility of its becoming older or younger, or that it should be said to be now past, or that it is yet to come. In a word, nothing can be applied to it which generation, or the receiving the beginning of existence, makes us apply to sensible objects; these last being all portions of time which revolve in successive periods and only imitate eternity. Time, therefore, began with the heavens, that, as they took rise together, they may be together dissolved, if such dissolution shall ever happen. It was formed upon the model of the eternal nature, and made as like to it as possible; the model having existed from all eternity, and the copy being to exist for all time, of which alone it can be said that *it was, it is, and will hereafter be.*

He afterwards describes the creation of the remaining animated parts of the universe: they were of four sorts,—the celestial race of the gods, —the winged inhabitants of the sky,—the finny shoals of the waters,—and the animals of the dry land. Having explained the igneous composition of the first, whom he calls visible or begotten gods, he subjoins the following remark-

able passage.—that, as for the other deities, besides these heavenly bodies, it was above his capacity to describe their nature or comprehend their generation; but we must believe those inspired persons, who, as they themselves say, are descendants of the gods, and who, some way or other, have come at a clear knowledge of their progenitors. No matter, he adds, though what they say be destitute of probable or necessary proof; we cannot refuse assent to these children of the gods, both as they prefer to relate their family concerns, and likewise in due obedience to the laws. But the Sovereign Creator, having finished the production of his celestial progeny, assembled them all together and spoke in this manner:—

Gods of the gods! whose maker I am, and author of your powers which, proceeding from me, if I so will, shall never be dissolved! Whatever hath been tied can be loosed; but to undo what has been well done, or to destroy an harmonious frame, is malicious and evil: wherefore as you have received a being, immortal indeed and indissolvable you are not; yet shall you never be dissolved nor taste the destiny of death; my unchangeable will being a greater and more authentic security than the bonds of life in which you were bound at your creation. Now, then, attend and learn what I appoint and enjoin. Three species of creatures are yet to be made. While these are wanting the heavens will be imperfect; it would not contain every kind of living creature, as it must do to be entirely complete. Were they, however, to be generated by me, and receive under my hand the sources of life, they must likewise prove immortal and be on a level with the gods. In order, therefore, that they may both be mortal, and that the whole may be perfect, do you according to your natures undertake the work, and, imitating my power in the production of yourselves, finish the animal creation. As for that which is to be styled immortal and divine, and which will be the leading principle in such of them as endeavour always to follow Right, and Us, that I myself will create and deliver over to you: then, for what remains, do you, interweaving the mortal with immortality, form and generate animals, nourish them with food, and receive them to your bosom when fallen to decay.

Thus God spake; and, turning to the eternal mould in which he had mixed and tempered the soul of the universe, he poured in the remains of the celestial creation, and mixing them together in nearly the same manner, but now not so pure and genuine as the former, nor all equally so, but of a first, second, and third alloy, he compounded the mighty mass and distributed minds equal in number to the stars,—a mind to every star: and, having placed them in these as in a chariot, he showed them the nature of the whole of things and fixed their irrevocable laws. First, that one common origin should be allotted to all, that no one might have less than another at the hands of his maker; but that, when they were disseminated each into the organ of time,—the heavenly body,—proper to them, they should produce the most religious and godlike of all mortal creatures,—man. But, as the human nature was to be twofold, the better sex was to be called the male; and, since they were of course to be transplanted into bodies, now in contact and now at a distance from surrounding objects, in the first place, one general sense must be natural to all, especially a perception of external violence;—next, mutual love, but mixed with pleasure and pain, and along with these fear and anger, with all their consequences and all their contraries. These passions if they can command, they shall live in justice and felicity; but if commanded by them, in wrong and misery. Whosoever, therefore, lives well his allotted time shall, after death, return to the habitation of his congenial star and there lead a blessed life; but failing, he must at his next birth assume the female nature. Both male and female, after 1000 years, shall by lot enter upon a second state, and choose what kind of life each pleases to lead

With almost every ancient theist of Greece, Plato believed in an order of beings called dæmons, which were superior to the souls of men, and struck off by the Demiurgus from the soul of the world. Of these the reader will find some account under DÆMON. We mention them here because they make an important appearance in Plato's system of physics, which was built upon them. He taught that, in the formation of the visible and tangible world, fire and earth were first formed, and were afterwards united by means of air and water; that from perfect parts one perfect whole was produced, of a spherical figure, as most beautiful in itself, and best suited to contain all other figures; that the elementary parts of the world are of regular geometrical forms, the particles of earth being cubical, those of fire pyramidical, those of air in the form of an octohedron, and those of water in that of an icosohedron; that these are adjusted in number, measure, and power, in perfect conformity to the geometrical laws of proportion; that the soul which pervades this sphere is the cause of its revolution round its centre; and, lastly, that the world will remain for ever, but that, by the action of its animating principle, it accomplishes certain periods, within which every thing returns to its ancient place and state. This periodical revolution of nature is called the Platonic or great year. Plato, preparatory to the study of all philosophy, required from his disciples a knowledge of the elements of mathematics. In his Republic, he makes Glaucus, one of the speakers, recommend them for their usefulness in human life. Concerning policy, Plato has written at large in his Republic, and in his Dialogue on Laws. He was so fond of his own ideas on this subject, that it was chiefly the hope of having an opportunity to realise his plan of a republic, which induced him to visit the court of Dionysius. But they who are conversant with mankind, and capable of calmly investigating the springs of human actions, will easily perceive that his projects were chimerical, and could only have originated in a mind replete with philosophical enthusiasm. Of this nothing can be a clearer proof than the design of admitting in his republic a community of women, to give reason an entire control over desire. The main object of his political institutions appears to have been

the subjugation of the passions and appetites, by means of the abstract contemplation of ideas. A system of policy, raised upon such fanciful grounds, cannot merit a more distinct consideration. Such is genuine Platonism as it was taught in the old academy by the founder of the school and his immediate followers; but, when Arcesilaus was placed at the head of the academies, great innovations were introduced both into their doctrines and mode of teaching. This man was therefore considered as the founder of what was afterwards called the middle academy. Being a professed sceptic, he carried his maxim of uncertainty to such a height as to alarm the general body of philosophers, offend the governors of the state, and bring just odium upon the very name of the academy. At length Carneades, one of the disciples of this school, relinquishing some of the more obnoxious tenets of Arcesilaus, founded what has been called the new academy with very little improvement on the principles of the middle. Under one or other of these forms Platonism found its way into the Roman republic. Cicero was a Platonist, and one of the greatest ornaments of the school. A school of Platonists was likewise founded in Alexandria in the second century of the Christian era; but their doctrines differed in many particulars from those taught in the three academies. They professed to seek truth wherever they could find it, and to collect their dogmas from every school. They endeavoured to bend some of the principles of Plato into a conformity with the doctrines of the gospel; and they incorporated with the whole many of the maxims of Aristotle and Zeno, and not a few of the fictions of the east. Their system was therefore extremely heterogeneous, and seldom so rational as that of the philosopher after whose name they were called, and of whose doctrines we have given so copious a detail.

PLATOON', *n. s.* Fr. *peloton.* A small square body of musketeers, drawn out of a battalion of foot, to strengthen the angles of a square. See below.

In comely wounds shall bleeding worthies stand,
Webb's firm *platoon*, and Lumly's faithful band.
Tickle.

PLATOON, in military affairs, was formerly a small body of men, in a battalion of foot, &c., that fired alternately. A battalion was then generally divided into sixteen platoons, exclusive of the grenadiers, which formed platoons, as occasion required. At present the battalion is generally divided into wings, grand divisions, divisions (or companies), subdivisions, and sections; and the word platoon is seldom used, except to denote a number (from ten to twenty) of recruits assembled for the purpose of instruction; in which case it may be considered synonymous with company.

PLATTER, *n. s.* From plate. A large dish, of earth or wood generally.

The servants wash the *platter*, scour the plate,
Then blow the fire. *Dryden's Juvenal.*

Satira is an adjective, to which lanx, a charger, or large *platter*, is understood. *Dryden.*

PLATYPUS, in zoology, a genus of mammalia, the generic character of which is that the mouth is shaped like the bill of a duck; feet palmate. There is but a single species, P. anatinus, a native of Australasia, of which Dr. Shaw gives the following description:—'Of all the mammalia,' says he, 'yet known, it seems the most extraordinary in its conformation; exhibiting the perfect resemblance of the beak of a duck, engrafted on the head of a quadruped. So accurate is the similitude that at first view it naturally excites the idea of some deceptive preparation by artificial means: the very epidermis, proportion, serratures, manner of opening, and other particulars of the beak of a shoveller, or other broad-billed species of duck, presenting themselves to the view: nor is it without the most minute and rigid examination that we can persuade ourselves of its being the real beak or snout of a quadruped.

The body is depressed, and has some resemblance to that of an otter in miniature: it is covered with a very thick, soft, and beaver-like fur, and is of a moderately dark brown above, and of a subferruginous white beneath. The head is flattish, and rather small than large: the mouth, or snout, as before observed, so exactly resembles that of some broad-billed species of duck that it might be mistaken for such; round the base is a flat circular membrane, somewhat deeper or wider below than above; viz. below near the fifth of an inch, and above about an eighth. The tail is flat, furry like the body, rather short and obtuse, with an almost bifid termination; it is broader at the base, and gradually lessens to the tip, and is about three inches in length: its color is similar to that of the body. The length of the whole animal, from the tip of the beak to that of the tail, is thirteen inches; of the beak an inch and a half. The legs are very short, terminating in a broad web, which on the fore feet extends to a considerable distance beyond the claws; but on the hind feet reaches no farther than the roots of the claws. On the fore feet are five claws, straight, strong, and sharp-pointed; the two exterior ones somewhat shorter than the three middle ones. On the hind-feet are six claws, longer and more inclined to a curved form than those of the fore feet; the exterior toe and claw are considerably shorter than the four middle ones; the interior or sixth is seated much higher up than the rest, and resembles a strong sharp spur. All the legs are hairy above; the fore-feet are naked both above and below; but the hind-feet are naked above and hairy below. The internal edges of the under mandible (which is narrower than the upper), are serrated or channelled with numerous striæ, as in a duck's bill. The nostrils are small and round, and are situated about a quarter of an inch from the tip of the bill, and are about the eighth of an inch distant from each other. There is no appearance of teeth; the palate is removed, but seems to have resembled that of a duck; the tongue also is wanting in the specimen. The ears or auditory foramina are placed about half an inch beyond the eyes; they appear like a pair of oval holes, of the eighth of an inch in diameter, there being no external ear. On the upper part of the head, on each side, a little beyond the beak, are situated

two smallish oval white spots, in the lower part of each of which are imbedded the eyes, or at least the parts allotted to the animal for some kind of vision; for, from the thickness of the fur and smallness of the organs, they seem to have been but obscurely calculated for distinct vision, and are probably like those of moles, and some other animals of that tribe; or perhaps even subcutaneous; the whole apparent diameter of the cavity in which they were placed not exceeding the tenth of an inch.

'When we consider the general form of this animal, and particularly its bill and webbed feet, we shall readily perceive that it must be a resident in watery situations; that it has the habits of digging or burrowing in the banks of rivers, or under ground; and that its food consists of aquatic plants and animals. This is all that can at present be reasonably guessed at; future observations, made in its native regions, will, it is hoped, afford us more ample information, and will make us fully acquainted with the natural history of an animal which differs so widely from all other quadrupeds, and which verifies in a most striking manner the observation of Buffon; viz. that whatever it was possible for nature to produce has actually been produced. On a subject so extraordinary as the present, a degree of scepticism is not only pardonable but laudable; and I ought, perhaps, to acknowledge that I almost doubt the testimony of my own eyes with respect to the structure of this animal's beak; yet must confess that I can perceive no appearance of any deceptive preparation; and the edges of the rictus, the insertion, &c., when tried by the test of maceration in water, so as to render every part completely moveable, seem perfectly natural; nor can the most accurate examination of expert anatomists discover any deception in this particular.'

Dr. Shaw observes, in a subsequent volume, as the result of more accurate experiments, that 'on laying open the parts beyond the base of the bill, it appears that the platypus, like the anteaters, is furnished with small bony processes, resembling grinding-teeth, imbedded in the gum, but not fastened or rooted in the jaw: of these processes there are two on each side, both of the upper and under jaw.'

PLAU'DIT, *n. s.*, PLAU'DITE. } Lat. *plaudite* (the old demand of applause made by the player, when he left the stage). Applause.

Some men find more melody in discord than in the angelic quires; yet even these can discern music in a concert of *plaudits*, eulogies given themselves. *Decay of Piety.*

True wisdom must our actions so direct,
Not only the last *plaudit* to expect. *Denham.*

She would so shamefully fail in the last act, that instead of a *plaudite*, she would deserve to be hissed off the stage. *More.*

PLAU'SIBLE, *adj.*, PLAUSIBIL'ITY, *n. s.*, PLAU'SIBLENESS, PLAU'SIBLY, *adv.*, PLAU'SIVE, *adj.* } Fr. *plausible, plausibilité*; from Lat. *plaudo.* Apparently deserving of praise; such as gains praise; specious; taking; popular: plausive is an obsolete adjective of the same signification, and all the other words follow the above senses.

Go you to Angelo, answer his requiring with a *plausible* obedience, agree with his demands to the point. *Shakspeare.*

His *plausive* words
He scattered not in ears; but grafted them
To grow there and to bear. *Id.*

Judges ought to be more reverend than *plausible*, and more advised than confident. *Bacon.*

They found that *plausible* and popular pretext of raising an army to fetch in delinquents. *King Charles.*

These were all *plausible* and popular arguments, in which they, who most desired peace, would insist upon many condescensions. *Clarendon.*

I hope they will *plausibly* receive our attempts, or candidly correct our misconjectures. *Browne.*

The notion of man's free will, and the nature of sin, bears with it a commendable plainness and *plausibleness*. *More.*

No treachery so *plausible* as that which is covered with the robe of a guide. *L'Estrange.*

The case is doubtful, and may be disputed with *plausible* arguments on either side. *South.*

Thou canst *plausibly* dispute,
Supreme of seers, of angel, man, and brute. *Prior.*

They could talk *plausibly* about what they did not understand, but their learning lay chiefly in flourish. *Collier.*

The *plausibleness* of Arminianism, and the congruity it hath with the principles of corrupt nature. *Saunderson.*

Two pamphlets, called the management of the war, are written with some *plausibility*, much artifice, and direct falsehoods. *Swift.*

PLAUTUS (Marcus Accius), a comic writer of ancient Rome, born at Umbria, in Italy. He is said to have acquired the Agnomen of Plautus from having splay feet. His parentage appears to have been mean; some say he was the son of a slave. Few facts have come down to us to illustrate his life. He came to Rome, and obtained not only fame but emolument from his dramatic compositions, which were represented about a century and a half before the Christian era. Plautus is said to have acquired considerable property, and to have been tempted, in order to increase it, to engage in trade, but that, like many other literary speculators, he succeeded so ill that he was reduced to so great poverty as to hire himself as a laborer to grind in a mill. Yet even in this toilsome situation his mind remained undepressed, and he composed three comedies. He died in the first year of the elder Cato's censorship, about A. U. C. 569, and A. A. C. 184. There are twenty of his plays extant, though not all entire. The best edition of his works is the Variorum of Gronovius.

PLAY', *v. n.*, *v. a.*, & *n. s.*, PLAY'BOOK, *n. s.*, PLAY'DAY, PLAY'DEBT, PLAY'ER, PLAY'FELLOW, PLAY'FUL, PLAY'GAME, PLAY'HOUSE, PLAY'PLEASURE, PLAY'SOME, *adj.*, PLAY'SOMENESS, *n. s.*, PLAY'THING, *n. s.*, PLAY'WRIGHT. } Saxon plegan; Teut. *belaichen*; Mod. Goth. *bilaiken*. To sport; frolic; wanton; toy; trifle; mock; practise trick or illusion; hence personate another in drama or otherwise; act in any marked or particular character; touch a musical

instrument: as a verb neuter, to use such an instrument; exhibit dramatically; act; perform: a play is, sport; amusement; assumed appearance or conceit; game; practice of gaming; action; employment; office; agitation or motion; liberty of action or motion; a dramatic composition: a play debt is used particularly for a debt contracted in gaming: a play-wright for an author of a dramatic piece or pieces: the other compounds are sufficiently obvious in their meaning.

The people sat down to eat, and to drink, and rose up to *play*. *Exodus.*

Command thy servants to seek out a man who is a cunning *player* on the harp. 1 *Samuel* xvi. 16.

Be of good courage, and let us *play* the men for our people. 2 *Samuel* x. 12.

Doubt would fain have *played* his part in her mind, and called in question how she should be assured that Zelmane was not Pyrocles. *Sidney.*

Determining, as after I knew, in secret manner, not to be far from the place where we appointed to meet, to prevent any foul *play* that might be offered unto me. *Id.*

Like *players* placed to fill a filthy stage,
Where change of thoughts one fool to other shews,
And all but jests, serve only sorrow's rage. *Id.*

Inconstant in his choice of his friends, or rather never having a friend but *playfellows*, of whom, when he was weary, he could no otherwise rid himself than by killing them. *Id.*

My dearling and my joy;
For love of me leave off this dreadful *play*.
Spenser.

She, seemed still back unto the land to look,
And her *playfellows* aid to call, and fear
The dashing of the waves. *Id.*

I'll bring my young man to school; look where his master comes; 'tis a *playing* day I see.
Shakspeare.

How every fool can *play* upon the word! *Id.*

When lenity and cruelty *play* for kingdoms,
The gentler gamester is the soonest winner. *Id.*

His mother *played* false with a smith. *Id.*

Every thing that heard him *play*,
Even the billows of the sea,
Hung their heads, and then lay by;
In sweet musick is such art,
Killing care, and grief of heart,
Fall asleep, or hearing die.
Id. Henry VIII.

John hath seized Arthur, and it cannot be,
That whilst warm life *plays* in that infant's veins,
The misplaced John should entertain
One quiet breath of rest. *Id. King John.*

Citherea all in sedges hid,
Which seem to move and wanton with her breath,
Even as the waving sedges *play* with wind.
Shakspeare.

Thus we *play* the fool with the time, and the spirits of the wise sit in the clouds and mock us. *Id.*

Only they,
That come to hear a merry *play*,
Will be deceived. *Id. Henry VIII.*

— Your pictures out of doors,
Saints in your injuries, devils being offended,
Players in your housewifery. *Id. Othello.*

Your precious self had not then crossed the eyes
Of my young *playfellow*. *Id. Winter's Tale.*

These are the youths that thunder at a *play-house*, and fight for bitten apples. *Id. Henry VIII.*

Certain pantomimi will represent the voices of *players* of interludes so to life, as you would think they were those *players* themselves. *Bacon.*

He taketh a kind of *playpleasure* in looking upon the fortunes of others. *Id. Essays.*

Boys and girls come out to *play*,
Moon shines as bright as day. *Old Song.*

Courts are theatres, where some men *play*
Princes, some slaves, and all end in one day.
Donne.

The snake bit him fast by the tongue, which therewith began so to rankle and swell, that, by the time he had knocked this foul *player* on the head, his mouth was scarce able to contain it. *Carew.*

Wherein doth our practice of singing and *playing* with instruments in our cathedral churches differ from the practice of David? *Peacham.*

Alphonso, duke of Ferrara, delighted himself only in turning and *playing* the joiner. *Id.*

'Tis possible these Turks may *play* the villains.
Denham.

Nature here
Wantoned as in her prime, and *played* at will
Her virgin fancies. *Milton.*
Two gentle fawns at *play*. *Id.*

O Castalio! thou hast caught
My foolish heart; and like a tender child,
That trusts his *plaything* to another hand,
I fear its harm, and fain would have it back.
Otway.

He was resolved not to speak distinctly, knowing his best *play* to be in the dark, and that all his safety lay in the confusion of his talk. *Tillotson.*

He hurries me from the *playhouse* and scenes there, to the beargarden. *Stillingfleet.*

Men are apt to *play* with their healths and their lives, as they do with their cloaths. *Temple.*

Clad like a country swain, he piped, he sung,
And *playing* drove his jolly troop along.
Dryden.

My wife cried out fire! and you brought out your buckets, and called for engines to *play* against it.
Id.

Ev'n kings but *play*; and when their part is done,
Some other, worse or better, mount the throne. *Id.*

A *play* ought to be a just image of human nature, representing its humours and the changes of fortune to which it is subject, for the delight and instruction of mankind. *Id.*

The senseless plea of right by providence
Can last no longer than the present sway;
But justifies the next who comes in *play*. *Id*

Thine be the laurel; then; support the stage,
Which so declines, that shortly we may see
Players and *plays* reduced to second infancy. *Id.*

Thus said the *player* god; and adding art,
Of voice and gesture, so performed his part,
She thought, so like her love the shade appears,
That Ceyx spake the words. *Id.*

I am a sufficient theatre to myself of ridiculous actions, without expecting company either in a court or *playhouse*. *Id.*

When they can make nothing else on't, they find it the best of their *play* to put it off with a jest.
L'Estrange.

In arguing, the opponent uses comprehensive and equivocal terms, to involve his adversary in the doubtfulness of his expression, and therefore the answer on his side makes it his *play* to distinguish as much as he can. *Locke.*

That liberty alone gives the true relish to their ordinary *playgames*. *Id.*

A child knows his nurse, and by degrees the *playthings* of a little more advanced age. *Id.*

The joints are let exactly into one another, that they have no *play* between them, lest they shake upwards or downwards. *Moxon.*

Life is not long enough for a coquette to *play* all her tricks in. *Addison's Spectator.*

She has several *playdebts* on her hand, which must be discharged very suddenly. *Id.*

He is scandalized in youth for being lively, and at childhood for being *playful.* *Id.*

He applied the pipe to his lips, and began to *play* upon it; the sound of it was exceeding sweet. *Id.*

The setting sun
Plays on their shining arms and burnished helmets,
And covers all the field with gleams of fire.
Addison.

Should a writer give the full *play* to his mirth, without regard to decency, he might please readers; but must be a very ill man, if he could please himself. *Id. Freeholder.*

O Richard,
Would fortune calm her present rage,
And give us *playthings* for our age. *Prior.*

A man has no pleasure in proving that he has *played* the fool. *Collier on Friendship.*

He *plays* a tickling straw within his nose. *Gay.*

Bull's friends advised to gentler methods with the young lord; but John naturally loved rough *play.* *Arbuthnot.*

There are multitudes of leases upon single lives, and *playdebts* upon joint lives. *Id.*

This was the *play* at which Nero staked three thousand two hundred and twenty-nine pounds three shillings and four pence upon every cast; where did he find *playfellows?* *Id.*

Take thy harp and melt thy maid;
Play, my friend! and charm the charmer.
Granville.

By constant laws, the food is concocted, the heart beats, the blood circulates, the lungs *play.* *Cheyne.*

Enormous monsters, rolling o'er the deep,
Gambol around him in the wat'ry way,
And heavy whales in awkward measures *play.*
Pope.

I would make use of it rather to *play* upon those I despised, than to trifle with those I loved. *Id.*

Had some brave chief the martial scene beheld
By Pallas guarded, in the dreadful field,
Might darts be bad to turn their points away,
And swords around him innocently *play*,
The war's whole art with wonder had he seen,
And counted heroes where he counted men. *Id.*

Shakspeare, whom you and ev'ry *playhouse* bill
Stile the divine, the matchless, what you will,
For gain, not glory, winged his roving flight,
And grew immortal in his own despight. *Id.*

Allow him but the *plaything* of a pen,
He ne'er rebels or plots like other men. *Id.*

He ended much in the character he had lived in; and Horace's rule for a *play* may as well be applied to him as a *playwright.* *Id.*

The clergyman *played* at whist and swobbers. *Swift.*

Visits, *plays*, and powdered beaux. *Id.*

I thought the life of every lady
Should be one continual *playday;*
Balls and masquerades and shows.
Id. Miscellanies.

Yours was a match of common good liking, without any mixture of that ridiculous passion, which has no being but in *playbooks* and romances. *Swift.*

Be it a weakness, it deserves some praise,
We love the *play-place* of our earlier days,
The scene is touching, and the heart is stone
That feels not at that sight, and feels at none.
Cowper.

PLAYFAIR (John), a distinguished Scottish natural philosopher and mathematician, was born at Bervie near Dundee in 1749. His father was a parochial clergyman; and, having finished his education at the university of St. Andrews, our author received ordination, and succeeded to his father's benefice in 1772. After holding it some years he resigned, and, going to Edinburgh, obtained the mathematical chair of the university. In 1778 he published in the Philosophical Transactions a paper on the Arithmetic of Impossible Quantities; and, on the establishment of the Royal Society of Edinburgh, was appointed one of the secretaries. To the first volume of its Transactions he contributed an Account of the Life and Writings of Matthew Stewart, Professor of Mathematics at Edinburgh, and an Essay on the Causes which affect the Accuracy of Barometrical Measurements. He also contributed to several of the subsequent volumes. Professor Playfair in 1816 visited the Alps for the purpose of making geological observations on the structure of those mountains. As a geologist he adopted the opinions of Dr. James Hutton, which he defended in his Illustrations of the Huttonian Theory, 4to. His death took place at Edinburgh, July 20th, 1819. Besides the productions noticed, he was the author of Elements of Geometry, 8vo.; and Outlines of Natural Philosophy, 2 vols. 8vo.; numerous articles in the Encyclopædia Britannica, &c. &c.

PLAYFAIR (William), an ingenious mechanic and author, born in the neighbourhood of Dundee, 1759, and brother of Mr. professor Playfair, was originally bound to a mill-wright of the name of Mickle, the celebrated Mr. John Rennie being his fellow-apprentice. At the expiration of his indentures he went to Birmingham, and was engaged there for some time by Mr. Watt as a draughtsman. Going to the continent he obtained accidentally, at Frankfort-on-the-Maine, a description of a telegraph then lately erected on the mountain of Belville, and, constructing two working models of the instrument, sent them to the duke of York; whence the plan of the machine first became known to England. He successively obtained several patents for useful inventions. After residing some time in London he again repaired to Paris, where he erected a rolling mill on a new plan, for which he obtained a patent; but, on the breaking out of the revolution, becoming obnoxious to Barrere, he returned to England. His pamphlets and works are so numerous that it becomes impossible to enumerate them. Those works by which he is most known are The Statistical Breviary; The Commercial and Political Atlas, 1786; The History of Jacobinism, 1795; Statistical Tables, exhibiting a View of all the States of Europe, 4to., 1800; and an Enquiry into the causes of the Decline and Fall of wealthy and powerful Nations, 4to., 1805, reprinted in 1807; a new edition of Adam Smith's Wealth of Nations, with supplementary chapters, &c. 3 vols. 8vo., 1806; A Statistical Account of the United States of America, translated from the French, 8vo. 1807; British Family Antiquity, 9 vols. 4to.; A Vindication of the Reign of

George III.; Political Portraits in this New Æra, 2 vols., 1814; and France as it is. Mr. Playfair was strongly attached to the Pitt school, but his Breviary and Atlas display considerable ingenuity, in simplyfying statistical details. He died February 11th, 1823.

PLEA, *n. s.* Old Fr. *plaid;* Belg. *pleit;* Lat. *placet.* The act or form of pleading; things offered or demanded in pleading; apology; excuse.

The magnificoes have all persuaded with him;
But none can drive him from the envious *plea*
Of forfeiture of justice and his bond. *Shakspeare.*

When such occasions are,
No *plea* must serve; 'tis cruelty to spare.
Denham.

They tow'rds the throne supreme,
Accountable, made haste, to make appear
With righteous *plea* their utmost vigilance.
Milton.

The fiend, with necessity,
The tyrant's *plea*, excused his devilish deeds. *Id.*

Their respect of persons was expressed in judicial process, in giving rash sentence in favour of the rich, without ever staying to hear the *plea*, or weigh the reasons of the poor's cause. *Kettlewell.*

Whoever argues in defence of absolute power in a single person, though he offers the old plausible *plea*, that it is his opinion, which he cannot help unless he be convinced, ought to be treated as the common enemy of mankind. *Swift.*

PLEA, in law, is what either party alleges for himself in court, in a cause there depending; and, in a more restrained sense, it is the defendant's answer to the plaintiff's declaration. Pleas are usually divided into pleas of the crown and common pleas.

i. PLEAS, COMMON (says judge Blackstone), are such suits as are carried on between common persons in civil cases. These are of two sorts; dilatory pleas, and pleas to the action.

1. PLEAS, DILATORY, are such as tend merely to delay or put off the suit, by questioning the propriety of the remedy, rather than by denying the injury; pleas to the action are such as dispute the very cause of suit. They are, 1. To the jurisdiction of the court; alleging, that it ought not to hold plea of this injury, it arising in Wales or beyond sea; or because the land in question is of ancient demesne, and ought only to be demanded in the lord's court, &c. 2. To the disability of the plaintiff, by reason whereof he is incapable to commence or continue the suit; as, that he is an alien, enemy, outlawed, excommunicated, attainted of treason or felony, under a præmunire, not in rerum naturâ (being only a fictitious person), an infant, a feme couvert, or a monk professed. 3. In abatement; which abatement is either of the writ, or the court, for some defect in one of them; as by misnaming the defendant, which is called a misnomer; giving him a wrong addition, as esquire instead of knight; or other want of form in any material respect. Or, it may be that the plaintiff is dead; for the death of either party is at once an abatement of the suit. These pleas to the jurisdiction, to the disability, or in abatement, were formerly very often used as mere dilatory pleas, without any foundation in truth, and calculated only for delay; but now, by stat. 4 and 5 Ann. c. 16, no dilatory plea is to be admitted without affidavit made of the truth thereof, or some probable matter shown to the court to induce them to believe it true. And, with respect to the pleas themselves, it is a rule that no exception shall be admitted against a declaration or writ, unless the defendant will in the same plea give the plaintiff a better; that is, show him how it might be amended, that there may not be two objections upon the same account. All pleas to the jurisdiction conclude to the cognizance of the court; praying 'judgment whether the court will have farther cognizance of the suit.' Pleas to the disability conclude to the person; by praying 'judgment, if the said A the plaintiff ought to be answered.' And pleas in abatement (when the suit is by original) conclude to the writ or declaration; by praying 'judgment of the writ, or declaration, and that the same may be quashed,' cassetur, made void, or abated: but, if the action be by bill, the plea must pray 'judgment of the bill,' and not of the declaration; the bill being here the original, and the declaration only a copy of the bill. When these dilatory pleas are allowed, the cause is either dismissed from that jurisdiction, or the plaintiff is stayed till his disability be removed; or he is obliged to sue out a new writ, by leave obtained from the court, or to amend and new frame his declaration. But when, on the other hand, they are over-ruled as frivolous, the defendant has judgment of respondeat ouster, or to answer over in some better manner. It is then incumbent on him to plead.

2. PLEAS TO THE ACTION are to answer to the merits of the complaint. This is done by confessing or denying it. A confession of the whole complaint is not very usual; for then the defendant would probably end the matter sooner, or not plead at all, but suffer judgment to go by default. Yet sometimes, after tender and refusal of a debt, if the creditor harasses his debtor with an action, it then becomes necessary for the defendant to acknowledge the debt, and plead the tender; adding that he has always been ready, tout temps prist, and is still ready, encore prist, to discharge it: for a tender by the debtor and refusal by the creditor will in all cases discharge the costs, but not the debt itself; though in some particular cases the creditor will totally lose his money. But frequently the defendant confesses one part of the complaint (by a cognovit actionem in respect thereof), and traverses or denies the rest; in order to avoid the expense of carrying that part to a formal trial which he has no ground to litigate. A species of this sort of confession is the payment of money into court: which is for the most part necessary upon pleading a tender, and is itself a kind of tender to the plaintiff; by paying into the hands of the proper officer of the court as much as the defendant acknowledges to be due, together with the costs hitherto incurred, in order to prevent the expense of any farther proceedings. This may be done upon what is called a motion; which is an occasional application to the court by the parties or their counsel, in order to obtain some rule or order of court, which becomes necessary in the progress of a cause; and it is usually grounded upon an affidavit (the perfect tense of the verb

affido), being a voluntary oath before some judge or officer of the court; to evince the truth of certain facts, upon which the motion is grounded: though no such affidavit is necessary for payment of money into court. If, after the money is paid in, the plaintiff proceeds in his suit, it is at his own peril: for, if he does not prove more due than is so paid into court, he shall be nonsuited and pay the defendant's costs; but he shall still have the money so paid in, for that the defendant has acknowledged to be his due. To this head may also be referred the practice of what is called a *set off*; whereby the defendant acknowledges the justice of the plaintiff's demand on the one hand; but, on the other, sets up a demand of his own, to counterbalance that of the plaintiff, either in the whole or in part; as, if the plaintiff sues for £10 due on a note of hand, the defendant may set off £9 due to himself for merchandise sold to the plaintiff; and, in case he pleads such set off, must pay the remaining balance into court. Pleas that totally deny the cause of complaint are either the general issue, or a special plea in bar. 1. The general issue, or general plea, is what traverses, thwarts, and denies at once, the whole declaration, without offering any special matter whereby to evade it. As in trespass either vi et armis, or on the case, 'non culpabilis, not guilty;' in debt upon contract, 'nihil debet, he owes nothing;' in debt on bond, 'non est factum, it is not his deed;' or, an assumpsit, 'non assumpsit, he made no such promise.' Or in real actions, 'nul tort, no wrong done; nul disseisin, no disseisin;' and in a writ of right, the mise or issue is, that 'the tenant has more right to hold than the demandant has to demand.' These pleas are called the general issue, because, by importing an absolute and general denial of what is alleged in the declaration, they amount at once to an issue; by which is meant a fact affirmed on one side and denied on the other. 2. Special pleas in bar of the plaintiff's demands are very various, according to the circumstances of the defendant's case. As, in real actions, a general release or a fine; both of which may destroy and bar the plaintiff's title. Or, in personal actions, an accord, arbitration, conditions performed, nonage of the defendant, or some other fact which precludes the plaintiff from his action. A justification is likewise a special plea in bar; as in actions of assault and battery, son assault demesne, that it was the plaintiff's own original assault; in trespass, that the defendant did the thing complained of in right of some office which warranted him so to do; or, in an action of slander, that the plaintiff is really as bad a man as the defendant said he was. Also a man may plead the statutes of limitation in bar; or the time limited by certain acts of parliament, beyond which no plaintiff can lay his cause of action. This by the statute of 32 Hen. VIII. c. 2, in a writ of right, is sixty years: in assises, writs of entry, or other possessory actions real, of the seisin of one's ancestors in lands; and either of their sesin, or one's own, in rent, suits, and services, fifty years: and in actions real for lands grounded upon one's own seisin or possession, such possession must have been within thirty years. By stat. 1 Mar. st. 2, c. 5, this limitation does not extend to any suit for avowsons. But by stat. 21 Jac. I. c. 2, a time of limitation was extended to the case of the king; viz. sixty years precedent to 19th of February 1623: but this becoming ineffectual, by efflux of time, the same date of limitation was fixed by stat. 9 Geo. III., c. 16, to commence and be reckoned backwards, from the time of bringing any suit or other process to recover the thing in question; so that a possession for sixty years is now a bar even against the prerogative, in derogation of the ancient maxim, Nullum tempus occurrit regi. By another stat., 21 Jac. I. c. 16, twenty years is the time of limitation in any write of formedon; and, by a consequence, twenty years is also the limitation in every action of ejectment; for no ejectment can be brought, unless where the lessor of the plaintiff is entitled to enter on the lands, and, by stat. 21 Jac. I. c. 16, no entry can be made by any man, unless within twenty years after his right shall accrue. Also all actions of trespass (quare clausum fregit, or otherwise), detinue, trover, replevin, account, and case (except upon accounts between merchants), debt on simple contract, or for arrears of rent, are limited by the statute last mentioned to six years after the cause of action commenced: and actions of assault, menace, battery, mayhem, and imprisonment, must be brought within four years, and actions for words two years, after the injury committed; and by stat. 31 Eliz. c. 5, all suits, indictments, and informations, upon any penal statutes, where any forfeiture is to the crown, shall be sued within two years, and, where the forfeiture is to a subject, within one year, after the offence committed, unless where any other time is specially limited by the statute. Lastly, by stat. 10 W. III. c. 14, no writ of error, scire facias, or other suit, shall be brought to reverse any judgment, fine, or recovery, for error, unless it be prosecuted within twenty years. The use of these statutes of limitation is to preserve the peace of the kingdom, and to prevent those innumerable perjuries which might ensue if a man were allowed to bring an action for any injury committed at any distance of time. Upon both these accounts the law therefore holds, that interest reipublicæ ut sit finis litium: and upon the same principle the Athenian laws in general prohibited all actions where the injury was committed five years before the complaint was made. If therefore, in any suit, the injury or cause of action happened earlier than the period expressly limited by law, the defendant may plead the statutes of limitations in bar: as upon an assumpsit, or promise to pay money to the plaintiff, the defendant may plead, Non assumpsit infra sex annos, he made no such promise within six years; which is an effectual bar to the complaint. An estoppel is likewise a special plea in bar; which happens where a man hath done some act, or executed some deed, which stops or precludes him from averring any thing to the contrary. As if a tenant for years (who hath no freehold) levies a fine to another person. Though this is void as to strangers, yet it shall work as an estoppel to the cognizor; for, if he afterwards brings an action to recover these lands, and his fine is plead-

ed against him, he shall thereby be stopped from saying that he had no freehold at the time, and therefore was incapable of levying it. The conditions and qualities of a plea (which, as well as the doctrine of estoppels, will also hold equally, mutatis mutandis, with regard to other parts of pleading), are, 1. That it be single and containing only one matter; for duplicity begets confusion. But by stat. 4 and 5 Ann. c. 16, a man, with leave of the court, may plead two or more distinct matters or single pleas; as in an action of assault and battery, these three, Not guilty, son assault demesne, and the statute of limitations. 2. That it be direct and positive, and not argumentative. 3. That it have convenient certainty of time, place, and persons. 4. That it answer the plaintiff's allegations in every material point. 5. That it be so pleaded as to be capable of trial. Special pleas are usually in the affirmative, sometimes in the negative, but they always advance some new fact not mentioned in the declaration; and then they must be averred to be true in the common form:—'And this he is ready to verify.'—This is not necessary in pleas of the general issue, those always containing a total denial of the facts before advanced by the other party, and therefore putting him upon the proof of them.

ii. Pleas of the Crown are all suits in the king's name, or in the name of the attorney-general in behalf of the king, for offences committed against his crown and dignity, and against his peace; as treason, murder, felony, &c. See Arraignment.

Plea to Indictment is the defensive matter alleged by a criminal on his indictment. This is either, 1. A plea to the jurisdiction; 2. A demurrer; 3. A plea in abatement; 4. A special plea in bar; or, 5. The general issue.

I. A plea to the jurisdiction is where an indictment is taken before a court that has no cognizance of the offence; as if a man be indicted for a rape at the sheriff's tourn, or for treason at the quarter sessions; in these, or similar cases, he may except to the jurisdiction of the court, without answering at all to the crime alleged.

II. A demurrer to the indictment is incident to criminal cases, as well as civil, when the fact as alleged is allowed to be true, but the prisoner joins issue upon some point of law in the indictment by which he insists, that the fact, as stated, is no felony, treason, or whatever the crime is alleged to be. Thus, for instance, if a man be indicted for feloniously stealing a grayhound; which is an animal in which no valuable property can be had, and therefore it is not felony, but only a civil trespass to steal it; in this case the party indicted may demur to the indictment; denying it to be felony, though he confesses the act of taking it. Some have held, that if, on demurrer, the point of law be adjudged against the prisoner, he shall have judgment and execution, as if convicted by verdict. But this is denied by others, who hold that in such case he shall be directed and received to plead the general issue, Not guilty, after a demurrer determined against him. Which appears the more reasonable, because it is clear, that if the prisoner freely discovers the fact in court, and refers it to the court whether it be felony or not; and, upon the fact thus shown, it appears to be felony, the court will not record the confession, but admit him afterwards to plead not guilty. And this seems to be a case of the same nature, being for the most part a mistake in point of law, and in the conduct of his pleading; and, though a man by mispleading may in some cases lose his property, yet the law will not suffer him by such niceties to lose his life. However, upon this doubt, demurrers to indictments are seldom used; since the same advantages may be taken upon a plea of not guilty; or afterwards in arrest of judgment, when the verdict has established the fact.

III. A plea in abatement is principally for a misnomer, a wrong name, or a false addition to the prisoner. As, if James Allen, gentleman, is indicted by the name of John Allen, esquire, he may plead that he has the name of James, and not of John; and that he is a gentleman, and not an esquire. And, if either fact is found by a jury, then the indictment shall be abated, as writs and declarations may be in civil actions. But, in the end, there is little advantage accruing to the prisoner by means of these dilatory pleas: because, if the exception be allowed, a new bill of indictment may be framed, according to what the prisoner in his plea avers to be his true name and addition. For it is a rule, upon all pleas of abatement, that he who takes advantage of a flaw, must at the same time show how it may be amended. Let us therefore next consider a more substantial kind of plea, viz.

IV. Special pleas in bar; which go to the merits of the indictment, and give a reason why the prisoner ought not to answer it at all, nor put himself upon his trial for the crime alleged. These are of four kinds: a former acquittal, a former conviction, a former attainder, or a pardon. There are many other pleas which may be pleaded in bar of an appeal: but these are applicable to both appeals and indictments. 1. First, the plea of auterfoits acquit, or a former acquittal, is grounded on this universal maxim of the common law of England, that no man is to be brought into jeopardy of his life, more than once, for the same offence. And hence it is allowed as a consequence, that when a man is once fairly found not guilty upon any indictment or other prosecution, before any court having competent jurisdiction of the offence, he may plead such acquittal in bar of any subsequent accusation for the same crime. 2. Secondly, the plea of auterfois convict, or a former conviction of the same identical crime, though no judgment was ever given, or perhaps will be (being suspended by the benefit of clergy or other causes), is a good plea in bar to an indictment. And this depends upon the same principle as the former, that no man ought to be twice brought in danger of his life for one and the same crime. 3. Thirdly, the plea of auterfois attaint, or a former attainder, is a good plea in bar, whether it be for the same or any other felony. For wherever a man is attainted of felony, by judgment of death either upon a verdict or confession, by outlawry, or heretofore by adjuration, and whether upon an appeal or

an indictment; he may plead such attainder in bar to any subsequent indictment or appeal for the same or for any other felony. And this because, generally, such proceeding on a second prosecution cannot be to any purpose; for the prisoner is dead in law by the first attainder, his blood is already corrupted, and he has forfeited all that he had: so that it is absurd and superfluous to endeavour to attaint him a second time. Though to this general rule, as to all others, there are some exceptions; wherein, cessante ratione, cessat et ipsa lex. 4. Lastly, a pardon may be pleaded in bar; as at once destroying the end and purpose of the indictment, by remitting that punishment which the prosecution is calculated to inflict. There is one advantage that attends pleading a pardon in bar, or in arrest of judgment, before sentence is past; which gives it by much the preference to pleading it after sentence or attainder. This is, that by stopping the judgment, it stops the attainder, and prevents the corruption of the blood: which, when once corrupted by attainder, cannot afterwards be restored otherwise than by act of parliament.

V. The general issue, or plea of not guilty, upon which plea alone the prisoner can receive his final judgment of death. In case of an indictment of felony or treason, there can be no special justification put in by way of plea. As, on an indictment for murder, a man cannot plead that it was in his own defence against a robber on the highway, or a burglar; but he must plead the general issue, Not Guilty, and give this special matter in evidence. For (besides that these pleas do in effect amount to the general issue; since, if true, the prisoner is most clearly not guilty) as the facts in treason are said to be done proditoriè et contra ligeantiæ suæ debitum; and, in felony, that the killing was done felonicè; these charges, of a traitorous or felonious intent, are the points and very gist of the indictment, and must be answered directly, by the general negative, not guilty; and the jury upon the evidence will take notice of any defensive matter, and give their verdict accordingly as effectually as if it were or could be specially pleaded. So that this is, upon all accounts, the most advantageous plea for the prisoner. When the prisoner has thus pleaded not guilty, non culpabilis, or nient culpable, which was formerly used to be abbreviated upon the minutes, thus, Non. (or nient) cul., the clerk of the assize, or clerk of the arraigns, on account of the crown replies, that the prisoner is guilty, and that he is ready to prove him so. This is done by two monosyllables in the same spirit of abbreviation cul. prit: which signifies first that the prisoner is guilty (cul. culpable, or culpabilis), and then that the king is ready to prove him so (prit, præsto sum, or paratus, verificare). By this replication the king and the prisoner are therefore at issue; for when the parties come to a fact which is affirmed on one side and denied on the other, then they are said to be at issue in point of fact; which is evidently the case here, in the plea of non. cul. by the prisoner, and the replication of cul. by the clerk.

PLEACH, *v. a.* Fr. *plesser*. To bend; to interweave. See PLASH. A word not in use.

Wouldest thou be windowed in great Rome, and see
Thy master thus, with *pleacht* arms, bending down
His corrrigible neck? *Shakspeare.*

Steal into the *pleached* bower,
Where honey-suckles, ripened by the sun,
Forbid the sun to enter. *Id.*

PLEAD', *v. n.* & *v. a.*, PLEAD'ABLE, PLEAD'ER, PLEAD'ING. Fr. *plaider*; Span. *pleytar*; Belg. *pleyten, pleyderen*; all of Lat. *placet*. To argue before a court; speak in an argumentative way: reason; be offered as an excuse: as a verb active, to defend; allege; discuss; offer as a plea: pleadable is, that may be alleged in defence: a pleader is, a legal advocate; any one who speaks for or against in argument: pleading, the act or form of a public trial or discussion. We plead not guilty, we must add, with regard to the sentiment in the extract from Selden; but it probably suggested Paley's excuse for the same legal falshood.

O that one might *plead* for a man with God, as a man *pleadeth* for his neighbour! *Job* xvi. 21.

Don Sebastian came forth to intreat that they might part with their arms like soldiers; it was told him that they could not justly *plead* law of nations, for that they were not lawful enemies. *Spenser.*

To his accusations
He *pleaded* still not guilty; and alledged
Many sharp reasons. *Shakspeare. Henry VIII.*
Will you, we shew our title to the crown?
If not, our swords shall *plead* it in the field. *Shakspeare.*

If you
Would be your country's *pleader*, your good tongue
Might stop our countryman. *Id. Coriolanus.*

A man may *plead* not guilty, and yet tell no lie; for, by the law, no man is bound to accuse himself; so that, when I say not guilty, the meaning is, as if I should say by way of paraphrase, I am not so guilty as to tell you; if you will bring me to trial, and have me punished for this you bring to my charge, prove it against me. *Selden.*

If nature *plead* not in a parent's heart,
Pity my tears, and pity her desert. *Dryden.*

I ought to be discharged from this information, because this privilege is *pleadable* at law. *Id.*

So fair a *pleader* any cause may gain. *Id.*

It must be no ordinary way of reasoning, in a man that is *pleading* for the natural power of kings, and against all compact, to bring for proof an example where his own account founds all the right upon compact. *Locke.*

Of beauty sing;
Let others govern or defend the state,
Plead at the bar, or manage a debate. *Granville.*
The brief with weighty crimes was charged,
On which the *pleader* much enlarged. *Swift's Miscellanies.*

If the heavenly folk should know,
These *pleadings* in the court below. *Id.*

Lawyers and divines write down short notes, in order to preach or *plead*. *Watts on the Mind.*

He was treated with great harshness and severity, but declining their questions, by *pleading* his oath of secrecy, was at last dismissed. *Johnson.*

Oh how inscrutable are the depths and deceits of the human heart!—Had my enemy brought against me a charge of indolence, self-indulgence, or pride, and impatience, or a too quick resentment of affronts and injuries, my own heart must have confirmed the accusation, and forced me to *plead* guilty. *Mason.*

Pleadings, in law, are the mutual altercations between the plaintiff and defendant. See Process, Suit, and Writ. They form the third part or stage of a fact; and at present are set down and delivered into the proper office in writing, though formerly they were usually put in by their counsel ore tenus, or vivâ voce, in court, and then minuted down by the chief clerks or prothonotaries; whence, in old law French, the pleadings are frequently denominated the parol. The first of these is the declaration, narratio, or count, anciently called the tale; in which the plaintiff sets forth his cause of complaint at length: being indeed only an amplification or exposition of the original writ upon which his action is founded, with the additional circumstances of time and place, when and where, the injury was committed. In local actions, says judge Blackstone, where the possession of land is to be recovered, or damages for any actual trespass, or for waste, &c., affecting land, the plaintiff must lay his declaration or declare his injury to have happened in the very county and place that it really did happen; but in transitory actions, for injuries that might have happened any where, as debt, detinue, slander, and the like, the plaintiff may declare in what county he pleases, and then the trial must be in that county in which the declaration is laid. Though, if the defendant will make affidavit that the cause of action, if any, arose not in that but another county, the court will direct a change of the venue or visne (that is, the vicinia or neighbourhood in which the injury is declared to be done), and will oblige the plaintiff to declare in the proper county. For the statute 6 Ric. II. c. 2, having ordered all writs to be laid in their proper counties, this, as the judges conceived, empowered them to change the venue, if required, and not to insist rigidly on abating the writ: which practice began in the reign of James I. And this power is discretionally exercised, so as not to cause but prevent a defect of justice. Therefore the court will not change the venue to any of the four northern counties previous to the spring circuit; because there the assizes are holden only once a year, at the time of summer circuit. And it will sometimes remove the venue from the proper jurisdiction (especially of the narrow and limited kind), upon a suggestion, duly supported, that a fair and impartial trial cannot be had therein. It is generally usual, in actions upon the case, to set forth several cases, by different counts in the same declaration; so that if the plaintiff fails in the proof of one, he may succeed in another. As in an action on the case upon an assumpsit for goods sold and delivered, the plaintiff usually counts or declares, first, upon a settled and agreed price between him and the defendant; as that they bargained for £20: and, lest he should fail in the proof of this, he counts likewise upon a quantum valebant; that the defendant bought other goods, and agreed to pay him so much as they were reasonably worth: and then avers that they were worth other £20, and so on in three or four different shapes; and at last concludes with declaring that the defendant had refused to fulfil any of these agreements, whereby he is endamaged to such a value. And if he proves the case laid in any one of his counts, though he fails in the rest, he shall recover proportional damages. This declaration always concludes with these words, 'and thereupon he brings suit,' &c., inde producit sectam, &c. By which words, suit or secta (a sequendo) were anciently understood the witnesses or followers of the plaintiff. For in former times the law would not put the defendant to the trouble of answering the charge till the plaintiff had made out at least a probable case. But the actual production of the suit, secta, or followers, is now antiquated, and has been totally disused ever since the reign of Edward III. though the form still continues. At the end of the declaration are added also the plaintiff's common pledges of prosecution, John Doe and Richard Roe; which, as elsewhere observed (see Writ), are now mere names of form; though formerly they were of use to answer to the king for the amercement of the plaintiff, in case he were non-suited, barred of his action, or had a verdict and judgment against him. For if the plaintiff neglects to deliver a declaration for two terms after the defendant appears, or is guilty of other delays or defaults against the rules of law in any subsequent stage of the action, he is adjudged not to follow or pursue his remedy as he ought to do; and thereupon a nonsuit, or non prosequitur, is entered, and he is said to be non pros'd. And for thus deserting his complaint, after making a false claim or complaint (pro falso clamore suo), he shall not only pay costs to the defendant, but is liable to be amerced to the king.

A retraxit differs from a nonsuit, in that the one is negative and the other positive: the nonsuit is a default and neglect of the plaintiff, and therefore he is allowed to begin his suit again upon payment of costs; but a retraxit is an open and voluntary renunciation of his suit in court; and by this he for ever loses his action. A discontinuance is somewhat similar to a nonsuit; for when a plaintiff leaves a chasm in the proceedings of his cause, as by not continuing the process regularly from day to day, and time to time, as he ought to do, the suit is discontinued, and the defendant is no longer bound to attend; but the plaintiff must begin again, by suing out a new original, usually paying costs to his antagonist. When the plaintiff has stated his case in the declaration, it is incumbent on the defendant, within a reasonable time, to make his defence, and to put in a plea; or else the plaintiff will at once recover judgment by default, or nihil dicit, of the defendant. Defence, in its true legal sense, signifies not a justification, protection, or guard, which is now its popular signification; but merely an opposing or denial (from the French verb defendre) of the truth or validity of the complaint. It is the contestatio litis of the civilians: a general assertion that the plaintiff has no ground of action; which assertion is afterwards extended and maintained in his plea. Before defence made, if at all, cognizance of the suit must be claimed or demanded; when any person or body corporate has the franchise, not only of holding pleas within a particular limited

jurisdiction, but also of the cognizance of pleas; and that either without any words exclusive of other courts, which entitles the lord of the franchise, whenever any suit that belongs to his jurisdiction is commenced in the courts of Westminster, to demand the cognizance thereof; or with such exclusive words, which also entitle the defendant to plead to the jurisdiction of the court. Upon this claim of cognizance, if allowed, all proceedings shall cease in the superior court, and the plaintiff is left at liberty to pursue his remedy in the special jurisdiction. As when a scholar or other privileged person of the universities of Oxford or Cambridge is impleaded in the courts at Westminster, for any cause of action whatsoever, unless upon a question of freehold. In these cases, by the charter of those learned bodies, confirmed by act of parliament, the chancellor, or vice-chancellor, may put in a claim of cognizance; which, if made in due time and form, and with due proof of the facts alleged, is regularly allowed by the courts. It must be demanded before full defence is made or imparlance prayed; for these are a submission to the jurisdiction of the superior court, and the delay is the laches in the lord of the franchise; and it will not be allowed if it occasions a failure of justice, or if an action be brought against the person himself who claims the franchise, unless he has also a power in such case of making another judge. After defence made, the defendant must put in his plea; but, before he defends, if the suit is commenced by capias or latitat, without any special original, he is entitled to demand one imparlance, or licentia loquendi; and may, before he pleads, have more granted by consent of the court, to see if he can end the matter amicably, without further suit, by talking with the plaintiff; a practice which is supposed to have arisen from a principle of religion in obedience to that precept of the gospel, 'agree with thine adversary quickly whilst thou art in the way with him.' And it may be observed that this gospel precept has a plain reference to the Roman law of the XII. tables, which expressly directed the plaintiff and defendant to make up the matter while they were in the way, or going to the prætor; in viâ rem uti pacent orato.

There are also many other previous steps which may be taken by a defendant before he puts in his plea. He may, in real actions, demand a view of the thing in question, to ascertain its identity and other circumstances. He may crave oyer of the writ, or of the bond, or other specialty upon which the action is brought; that is, to hear it read to him: the generality of defendants in the times of ancient simplicity being supposed incapable to read it themselves; whereupon the whole is entered verbatim upon the record; and the defendant may take advantage of any condition or other part of it, not stated in the plaintiff's declaration. In real actions also the tenant may pray in aid, or call for the assistance of another to help him to plead, because of the feebleness or imbecility of his own estate. Thus a tenant for life may pray in aid of him that has the inheritance in remainder or reversion; and an incumbent may pray in aid of the patron or ordinary; that is, that they shall be joined in the action, and help to defend the title. Voucher also is the calling in of some person to answer the action, that hath warranted the title to the tenant or defendant. This is still made use of in the form of common recoveries, which are grounded on the writ of entry; a species of action that relies chiefly on the weakness of the tenant's title, who therefore vouches another person to warrant it. If the vouchee appears he is made defendant instead of the voucher; but, if he afterwards makes default, recovery shall be had against the original defendant; and he shall recover an equivalent in value against the deficient vouchee. In assizes, indeed, where the principal question is, whether the demandant or his ancestors were or were not in possession till the ouster happened, and the title of the tenant is little if at all discussed, there no voucher is allowed, but the tenant may bring a writ of warrantia chartæ against the warranter, to compel him to assist him with a good plea or defence, or else to render damages and the value of the land, if recovered against the tenant. In many real actions also, brought by or against an infant under the age of twenty-one years, and also in actions of debt brought against him, as heir to any deceased ancestor, either party may suggest the nonage of the infant, and pray that the proceedings may be deferred till his full age, or, in the legal phrase, that the infant may have his age, and that the parol may demur, that is, that the pleadings may be stayed; and then they shall not proceed till his full age, unless it be apparent that he cannot be prejudiced thereby. But by the statutes of Westm. 1, 3, Edw. I. c. 46, and of Gloucester, 6 Edw. I. c. 2, in writs of entry sur disseisin in some particular cases, and in actions au cestrel brought by an infant, the parol shall not demur; otherwise he might be deforced of his whole property, and even want of maintenance till he came of age. So, likewise, in a writ of dower, the heir shall not have his age; for it is necessary that the widow's claim be immediately determined, else she may want a present subsistence. Nor shall an infant patron have it in a quare impedit, since the law holds it necessary and expedient that the church be immediately filled. When these proceedings are over, the defendant must then put in his excuse or plea. See Plea. No man is allowed to plead specially such a plea as amounts only to the general issue, or a total denial of the charge; but in such case he must plead the general issue in terms whereby the whole question is referred to a jury. But if the defendant, in an assize or action in trespass wish to refer the validity of his title to the court rather than the jury, he may state his title specially; and give color to the plaintiff, or suppose him to have an appearance or color of title. As if his own true title is, that he claims by feoffment with livery from A, by force of which he entered on the lands in question; he cannot plead this by itself, as it amounts to no more than the general issue. But he may allege this specially, provided he goes farther, and says, that the plaintiff claiming by color of a prior deed of fe-

offment, without livery, entered; upon whom he entered; and may then refer to the judgment of the court which of these two titles is the best in point of law.

When the plea of the defendant is thus put in, if it does not amount to a total contradiction of the declaration, but only evades it, the plaintiff may plead again, and reply to the defendant's plea: either traversing it, i. e. totally denying it; as if, on an action of debt upon bond, the defendant plead solvit ad diem, that he paid the money when due; here the plaintiff in his replication may totally traverse this plea, by denying that the defendant paid it: or he may allege new matter in contradiction to the defendant's plea; as, when the defendant pleads no award made, the plaintiff may reply and set forth an actual award, and assign a breach: or the replication may confess and avoid the plea, by some new matter or distinction; as, in an action for trespassing upon land of which the plaintiff is seised, if the defendant show a title to the land by descent, and that therefore he had a right to enter, and give color to the plaintiff, the plaintiff may either traverse and totally deny the fact of the descent, or he may confess and avoid it by replying that true it is that such descent happened, but that, since the descent, the defendant himself demised the lands to the plaintiff for term of life.

To the replication the defendant may rejoin or put in an answer called a rejoinder. The plaintiff may answer the rejoinder by a sur-rejoinder; upon which the defendant may rebut, and the plaintiff answer him by a sur-rebutter. Which pleas, replications, rejoinders, sur-rejoinders, rebutters, and sur-rebutters, answer to the exceptio, replicatio, duplicatio, triplicatio, and quadruplicatio, of the Roman laws. The whole of this process is denominated the pleading; in the several stages of which it must be carefully observed not to depart or vary from the title or defence which the party has once insisted on. For this, which is called a departure in pleading, might occasion endless altercation. Therefore the replication must support the declaration, and the rejoinder must support the plea, without departing out of it. As in the case of pleading no award made, in consequence of a bond of arbitration, to which the plaintiff replies, setting forth an actual award; now the defendant cannot rejoin that he has performed this award; for such rejoinder would be an entire departure from his original plea, which alleged that no such award was made; therefore he has now no other choice but to traverse the fact of the replication, or else to demur upon the law of it. Again, every plea must be simple, entire, connected, and confined to one single point; it must never be entangled with a variety of distinct independent answers to the same matter, which must require as many different replies, and introduce a multitude of issues upon one and the same dispute. For this would often embarrass the jury, and sometimes the court itself, and at all events would greatly enhance the expense of the parties. Yet it frequently is expedient to plead in such a manner as to avoid any implied admission of a fact which cannot with propriety or safety be positively affirmed or denied. And this may be done by what is called a protestation, by which the party interposes an oblique allegation or denial of some fact, protesting that such a matter does or does not exist; and at the same time avoiding a direct affirmation or denial. Sir Edward Coke has defined a protestation to be, 'an exclusion of a conclusion;' for the use of it is, to save the party from being concluded with respect to some fact or circumstance which cannot be directly affirmed or denied without falling into duplicity of pleading, and which yet, if he did not thus enter his protest, he might be deemed to have tacitly waived or admitted. So if a defendant, by way of inducement to the point of his defence, alleges a particular mode of seisin or tenure which the plaintiff is unwilling to admit, and yet desires to take issue on the principal point of the defence, he must deny the seisin or tenure by way of protestation, and then traverse the defensive matter. So, lastly, if an award be set forth by the plaintiff, and he can assign a breach in one part of it, and yet is afraid to admit the performance of the rest of the award, or to aver in general a non-performance of any part of it, lest something should appear to have been performed, he may save to himself any advantage he might hereafter make of the general non-performance, by alleging that by protestation he can plead only the non-payment of the money. In any stage of the pleadings, when either side advances or affirms any new matter, he usually avers it to be true; 'and this he is ready to verify.' On the other hand, when either side traverses or denies the facts pleaded by his antagonist, he usually tenders an issue, as it is called; the language of which is different according to the party by whom it is tendered; for if the traverse or denial come from the defendant, the issue is tendered in this manner: 'And of this he puts himself upon the country,' thereby submitting himself to the judgment of his peers; but if the traverse lies upon the plaintiff, he tenders the issue or prays the judgment of the peers against the defendant in another form; thus, 'and this he prays may be enquired of by the country.' But if either side pleads a special negative plea, not traversing or denying any thing that was before alleged, but disclosing some new negative matter; as where the suit is on a bond conditioned to perform an award, and the defendant pleads negatively that no award was made; he tenders no issue upon this plea, because it does not yet appear whether the fact will be disputed, the plaintiff not having yet asserted the existence of any award; but when the plaintiff replies, and sets forth an actual specific award, if then the defendant traverses the replication, and denies the making of any such award, he then, and not before, tenders an issue to the plaintiff. For when, in the course of pleading, they come to a point which is affirmed on one side, and denied on the other, they are then said to be at issue; all their debates being at last contracted into a single point, which must now be determined either in favor of the plaintiff or of the defendant. See Issue.

PLEAS'ANCE, *n. s.*
P[illegible]
Pleas'antly, *adv.*
Pleas'antness, *n.*
Pleas'antry,
Please, *v.*
Pleas'er, *n. s.*
Pleas'ingly
Pleas'ingness
Please'man,
Pleas'ure, *n. s.* & *v. a.*
Pleas'ureful, *adj.*

Fr. *plaisance, plaisant, plaire*; Span. *placer*; Port. *plazer*; Ital. *piacere*; Lat. *placeo*. Gaiety; mirth; delight: pleasant is, delightful; [illegible]; lively; grateful [illegible] senses; trifling: pleasantly, pleasantness, and pleasantry, follow these senses; but the latter has a particular application to pleasant or sprightly talk; or a sprightly saying: to please is, to gratify; delight; accommodate; humor; content; obtain favor from: 'be pleased with,' to approve; favor: 'to be pleased,' to like: as a verb neuter, to afford pleasure; gain approbation; like; choose; condescend or comply: a pleaseman is, a sycophant; an officious parasite: the other derivatives follow the various senses of please.

I have seen thy face, and thou wast *pleased* with me. *Genesis.*

The Lord taketh *pleasure* in them that fear him. *Psalms.*

How good and how *pleasant* it is for brethren to dwell in unity! *Id.*

He will do his *pleasure* on Babylon. *Isaiah* xlviii.

This is my beloved son, in whom I am well *pleased*. *Matthew.*

Things, thus set in order,
Shall further thy harvest, and *pleasure* thee best. *Tusser.*

Doth not the *pleasantness* of this place carry in itself sufficient reward? *Sidney.*

The lovely *pleasance* and the lofty pride
Cannot expressed be by any art. *Spenser.*

Oh that men should put an enemy in their mouths, to steal away their brains! that we should with joy, *pleasance*, revel, and applause, transform ourselves into beasts! *Shakspeare.*

The gods are just, and of our *pleasant* vices
Make instruments to scourge us. *Id.*

Doctor Pinch,
Establish him in his true sense again,
And I will *please* you what you will demand. *Id.*

Please you, lords,
In sight of both our battles we may meet. *Id.*

Some carry-tale, some *pleaseman*, some slight zany,
That knows the trick to make my lady laugh,
Told our intents. *Id. Love's Labour Lost.*

Convey your *pleasures* in a spacious plenty,
And yet seem cold. *Shakspeare.*

Use your *pleasure*; if your love do not persuade you to come, let not my letter. *Id.*

I count it one of my greatest afflictions, that I cannot *pleasure* such an honourable gentleman. *Shakspeare.*

Planting of orchards is very profitable, as well as *pleasurable*. *Bacon.*

When the way of *pleasuring* and displeasuring lieth by the favourite, it is impossible any should be overgreat. *Id.*

This country, for the fruitfulness of the land and the conveniency of the sea, hath been reputed a very commodious and *pleasureful* country. *Abbot.*

Pleasingly troublesome thought and remembrance have been to me since I left you. *Suckling.*

Nay, the birds rural musick too
Is as melodious and as free,
As if they sung to *pleasure* you. *Cowley.*

King James was wont *pleasantly* to say, that the duke of Buckingham had given him a secretary who could neither write nor read. *Clarendon.*

Verdure clad
Her universal face with *pleasant* green. *Milton*

Sweeter thy discourse is to my ear,
Than fruits of palm-tree *pleasantest* to thirst. *Id.*

What next I bring shall *please*
Thy wish exactly to thy heart's desire. *Id.*

Not sunk in carnal *pleasure*. *Id.*

Thus to herself she *pleasingly* began. *Id.*

It affords a *pleasurable* habitation in every part, and that is the line ecliptick. *Browne's Vulgar Errours.*

We ascribe not only effects depending on the natural period of time unto arbitrary calculations, and such as vary at *pleasure*, but confirm our tenets by the uncertain account of others. *Browne.*

He would fain put on some *pleasantness*, but was not able to conceal his vexation. *Tillotson.*

Nothing is difficult to love; it will make a man cross his own inclinations to *pleasure* them whom he loves. *Id.*

Many of our most skilful painters were *pleased* to recommend this author to me, as one who perfectly understood the rules of painting. *Dryden's Dufresnoy.*

I found something that was more *pleasing* in them, than my ordinary productions. *Dryden.*

The end of the artist is *pleasingly* to deceive the eye. *Id.*

Raise tempests at your *pleasure*. *Id.*

They, who would prove their idea of infinite to be positive, seem to do it by a *pleasant* argument, taken from the negation of an end, which being negative, the negation of it is positive. *Locke.*

We can at *pleasure* move several parts of our bodies. *Id.*

There are, that the compounded fluid drain,
From different mixtures; so the blended streams,
Each mutually correcting each, create
A *pleasurable* medley. *Philips.*

It was refreshing, but composed, like the *pleasantness* of youth tempered with the gravity of age. *South.*

A cause of men's taking *pleasure* in the sins of others, is, that poor spiritedness that accompanies guilt. *Id.*

In all thy humours, whether grave or mellow,
Thou'rt such a touchy, testy, *pleasant* fellow. *Addison*

The harshness of reasoning is not a little softened and smoothed by the infusions of mirth and *pleasantry*. *Id.*

The grave abound in *pleasantries*, the dull in repartees and points of wit. *Id. Spectator.*

Our ill-judging thought
Hardly enjoys the *pleasurable* taste. *Prior.*

Let neither the power or quality of the great, or the wit of the *pleasant*, prevail with us to flatter the vices, or applaud the profaneness of wicked men. *Rogers.*

All the land in their dominions, being acquired by conquest, was disposed by them according to their *pleasure*. *Arbuthnot.*

Eustathius is of opinion, that Ulysses speaks *pleasantly* to Elpenor. *Broome.*

Leave such to trifle with more grace and ease,
Whom folly *pleases*, and whose follies *please*. *Pope.*

He gains all points, who *pleasingly* confounds,
Surprises, varies, and conceals the bounds. *Id.*

In hollow caves sweet Echoe quiet lies;
Her name with pleasures once she taught the shore,
Now Daphne's dead, and *pleasure* is no more. *Id.*

The first words that I learnt were, [illegible] my desire, that he would *please* to give me [illegible] liberty. *Swift.*

The itch of cavil, festering with disease,
No art can circumscribe, no genius *please*.
Whyte's Poems.

She soon shall see her tender brood,
The pride, the *pleasure* of the wood,
Amang the fresh green leaves bedewed,
Awake the early morning. *Burns.*

Vicissitude wheels round the motley crowd,
The rich grow poor, the poor become purse proud;
Business is labour, and man's weakness such,
Pleasure is labour too, and tires as much. *Cowper.*

PLEBEI'AN, *n. s.* & *adj.* Fr. *plebeien*; Lat. *plebeius*. One of the lower people: vulgar; low: plural populace.

Your *plebeians* if they be senators.
Shakspeare.

The differences of mouldable and not mouldable, scissible and not scissible, are *plebeian* notions. *Bacon.*

As swine are to gardens, so are tumults to parliaments and *plebeian* concourses to publick counsels. *King Charles.*

He through the midst unmarked,
In show *plebeian* angel militant
Of lowest order. *Milton's Paradise Lost.*

Dishonour not the vengeance I designed,
A queen! and own a base *plebeian* mind! *Dryden.*

Upon the least intervals of peace, the quarrels between the nobles and the *plebeians* would revive. *Swift.*

PLEBEIANS. The ancient Romans were divided into patricians and plebeians. The distinction was made by Romulus the founder of the city; who confined all dignities senatorial, civil, military, and sacerdotal, to the rank of patricians. But to prevent the seditions which such a distinction might produce through the pride of the higher order and the envy of the lower, he endeavoured to engage them to one another by reciprocal ties and obligations. Every plebeian was allowed to choose out of the body of the patricians a protector, who should be obliged to assist him with his interest and substance, and to defend him from oppression. These protectors were called patrons; the protected clients. But, though the attachment between the patrons and clients continued inviolate for above 600 years, yet during the republic, the struggles between the patricians and plebeians were often frequent and violent.. See ROME.

PLEBEIAN GAMES, in antiquity, were celebrated by the Roman people in remembrance, as some say, of their reconciliation with the patricians, after their expulsion from the city, A. U. C. 261; or, according to others, to commemorate the final destruction of the kingly power, A. U. C. 245. These games commenced on the seventh of the kalends of December, and continued three days in the circus.

PLECTRANTHUS, in botany, a genus of the gymnospermia order, and didynamia class of plants; natural order forty-second, verticillatæ: CAL. monophyllous, short, and bilabiated; the upper lip of which is large, oval, and bent upwards; the inferior lip is quadrifid, and divided into two laciniæ: COR. is monopetalous, ringent, and turned back; the labiæ look different ways, and from the base of the tube there is a nectarium like a spur: the filaments are in a declining situation, with [illegible] the stylus filiform; the stigma bifid. It has four seeds covered only by the calyx. There are two species, viz.—

1. P. fruticosus, a native of the Cape of Good Hope. It flowers from June to September.

2. P. punctatus, a native of Africa. It flowers from January to May.

PLECTRUM, πληκτρον, in ancient music, a small piece of wood or ivory used by the ancients in playing upon the lyre, crooked and pointed at both ends, in using which there was more spirit given to the tone, and less danger of hitting the wrong string than by using the finger.

PLEDGE', *n. s.* & *v. a.* Fr. *pleige*, *pleiger*; barb. Lat. *plegium*. Any thing plighted or put to pawn; a gage; security; surety; bail: to put in pawn; secure by pawn or pledge: hence invite to drink, in which anciently he who gave the invitation pledged himself for his friend's safety.

These men at the first were only pitied; the great humility, zeal, and devotion, which appeared to be in them, was in all men's opinion a *pledge* of their harmless meaning. *Hooker.*

If none appear to prove upon thy person
Thy heinous, manifest, and many treasons;
There is my *pledge*, I'll prove it on thy heart.
Shakspeare.

The fellow, that [illegible]
Parts bread with him, and *pledges*
The breath of him in a divided draught,
Is the readiest man to kill him. *Id. Timon.*

What purpose could there be of treason, when the Guianians offered to leave *pledges*, six for one? *Raleigh.*

That flexanimous orator began the king of Homebia's health; he presently *pledged* it. *Howel.*

Here's to thee, Dick; this whining love despise;
Pledge me, my friend, and drink till thou be'st wise.
Cowley.

That voice their liveliest *pledge*
Of hope in fears and dangers. *Milton.*

Good sureties will we have for thy return,
And at thy *pledges'* peril keep thy day. *Dryden.*

Money is necessary both for counters and for *pledges*, and carrying with it even reckoning and security. *Locke.*

The deliverance of Israel out of Egypt by the ministry of Moses was intended for a type and *pledge* of a spiritual deliverance which was to come by Christ. *Nelson.*

Hymen shall be atoned, shall join two hearts,
And Aribert shall be the *pledge* of peace. *Rowe.*

Asleep and naked as an Indian lay,
An honest factor stole a gem away;
He *pledged* it to the knight; the knight had wit,
So kept the diamond, and the rogue was bit.
Pope.

Time was, he closed as he began the day
With decent duty, not ashamed to pray
The practice was a bond upon his heart,
A *pledge* he gave for a consistent part,
Nor could he dare presumptuously displease
A power, confessed so lately on his kness.
Cowper.

PLEDGE in LAW. See PAWN.

PLE'DGET, *n. s.* Belg. *plagghe*. A small mass of lint.

I applied a good *pledget* of basilicon.
Wiseman's Surgery.

PLEDGET, BOLSTER, or COMPRESS, in surgery, is a kind of flat tent laid over a wound to imbibe the superfluous humors, and to keep it clean.

PLEI'ADS, *n. s.* } Lat. *pleiades*; Gr. πλει-
PLEI'ADES. } αδες. A northern constellation; the seven stars.

Canst thou bind the sweet influences of *Pleiades*, or loose the bands of Orion? *Job.* xxxvii. 31.

The *pleiades* before him danced,
Shedding sweet influence. *Milton.*

Then sailors quartered heaven, and found a name
For *pleiads*, hyads, and the northern car. *Dryden.*

PLEIADES, in astronomy, an assemblage of seven stars in the neck of the constellation Taurus. They are thus called from the Greek πλειν, navigare, to sail; as being terrible to mariners, by reason of the rains and storms that frequently rise with them. The Latins called them vergiliæ, from ver, spring; because of their rising about the time of the vernal equinox. The largest is of the third magnitude, and is called lucida pleiadum.

PLEIADES, in the mythology, the seven daughters of Atlas king of Mauritania, and Pleione, thus called from their mother. They were Maia, Electra, Taygete, Asterope, Merope, Halcyone, and Celœno; and were also called Atlantides, from their father. These princesses were carried off by Busiris, king of Egypt; but Hercules, having conquered him, delivered them to their father; yet they afterwards suffered a new persecution from Orion, who pursued them five years, till Jove, being prevailed on by their prayers, took them up into the heavens, where they form the constellation which bears their name. Maia was the mother of Mercury by Jupiter.

PLEIONE, in fabulous history, a daughter of Oceanus, who married Atlas, king of Mauritania, by whom she had a son and twelve daughters, seven of whom were from her called Pleiades, and five were called Hyades, from their brother Hyas.

PLEN'ARY, *adj.* & *n. s.* Lat. *plenus.* Full; complete; a complete or decisive procedure.

I am far from denying that compliance on my part for *plenary* consent it was not, to his destruction. *King Charles.*

The cause is made a *plenary* cause, and ought to be determined *plenarily.* *Ayliffe's Parergon.*

Institution without induction does not make a *plenary* against the king, where he has a title to present. *Id.*

A treatise on a subject should be *plenary* or full, so that nothing may be wanting, nothing which is proper omitted. *Watts.*

PLENILU'NARY, *adj.* Lat. *plenilunium.* Relating to the full moon.

If we add the two Egyptian days in every month, the interlunary and *plenilunary* exemptions, there would arise above an hundred more. *Browne.*

PLENIP'OTENT, *adj.* } Lat. *plenipotens.*
PLENIPOTEN'TIARY, *n. s.* } Invested with full power: a negotiator invested with full power.

My substitutes I send you, and create
Plenipotent on earth, of matchless might
Issuing from me. *Milton's Paradise Lost.*

They were only the *plenipotentiary* monks of the patriarchal monks. *Stillingfleet.*

PLE'NIST, *n. s.* } Lat. *plenus, plenitas*;
PLEN'ITUDE, } Gr. πλεον. One who
PLEN'TEOUS, *adj.* } believes in the univer-
PLEN'TEOUSLY, *adv.* } sal fulness of space,
PLEN'TEOUSNESS, *n. s.* } or that all space is
PLEN'TIFUL, *adj.* } full of matter: ple-
PLEN'TIFULLY, *adv.* } nitude, plenteousness,
PLEN'TIFULNESS, *n. s.* } plentifulness, and
PLEN'TY. } plenty, mean fulness; copiousness; abundance; completeness: repletion: plenty is also corruptly used for plentiful: plenteous is copious; abundant; exuberant; fertile: the adverb and noun substantive corresponding in sense: plentiful, synonymous with plenteous, only more commonly used in prose; plentifully and plentifulness corresponding.

The seven years of *plenteousness* in Egypt were ended. *Genesis.*

Ye shall eat in *plenty* and be satisfied, and praise the Lord. *Joel* ii. 26.

To grass with thy calves,
Where water is *plenty.* *Tusser's Husbandry.*

Thy due from me is tears,
Which nature, love, and filial tenderness
Shall, O dear father, pay thee *plenteously.* *Shakspeare.*

If reasons were as *plenty* as blackberries, I would give no man a reason on compulsion. *Id.*

To Amalthea he gave a country, bending like a horn; whence the tale of Amalthea's *plentiful* horn. *Raleigh.*

He that is *plentiful* in expences, will hardly be preserved from decay. *Bacon's Essay.*

The *plenitude* of the pope's power of dispensing was the main question. *Id. Henry VII.*

Lab'ring the soil and reaping *plenteous* crop. *Milton.*

God created the great whales and each
Soul living, each that crept, which *plenteously*,
The waters generated. *Id. Paradise Lost.*

They were not multiplied before, but they were at that time *plentifully* encreased. *Browne.*

Those spaces, which the vacuists would have empty, because devoid of air, the *plenists* do not prove replenished with subtle matter by any sensible effects. *Boyle.*

When they had a *plentiful* harvest, the farmer had hardly any corn. *L'Estrange.*

What makes land, as well as other things, dear, is *plenty* of buyers, and but few sellers; and so *plenty* of sellers, and few buyers, makes land cheap. *Locke.*

Bern is *plentifully* furnished with water, there being a great multitude of fountains. *Addison's Italy.*

The *plenitude* of William's fame
Can no accumulated stores receive. *Prior.*

If there were every where an absolute *plenitude* and density without any pores between the particles of bodies, all bodies of equal dimensions would contain an equal quantity of matter, and consequently be equally ponderous. *Bentley.*

Relaxation from *plenitude* is cured by spare diet. *Arbuthnot.*

God proves us in this life, that he may the more *plenteously* reward us in the next. *Wake.*

Two *plenteous* fountains the whole prospect crowned;
This through the gardens leads its streams around. *Pope.*

Alcibiades was a young man of noble birth, excellent education, and a *plentiful* fortune. *Swift*

Whose grievance is satiety of ease,
Freedom their pain and *plenty* their disease.
Harte.

The teeming clouds
Descend in gladsome *plenty* o'er the world.
Thomson.

There's Johnie o' the Buskie-glen,
Fu' is his barn, fu' is his byre;
Tak this frae me, my bonnie hen,
It's *plenty* beets the luver's fire. *Burns.*

Spring hangs her infant blossoms on the trees,
Rocked in the cradle of the western breeze;
Summer in haste the thriving charge receives,
Beneath the shade of her expanded leaves;
Till autumn's fiercer heats and *plenteous* dews
Dye them at last in all their glowing hues.
Cowper.

PLENUM, in physics, denotes, according to the Cartesians, that state of things wherein every part of space is supposed to be full of matter, in opposition to a vacuum, which is a space supposed devoid of all matter.

PLESH, *n. s.* Used by Spenser instead of PLASH, which see. A puddle; boggy marsh.

Out of the wound the red blood flowed fresh,
That underneath his feet soon made a purple *plesh.*
Spenser.

PLETH'ORA, or } Gr. πληϑωρα. The
PLETH'ORY, *n. s.* } state in which the vessels
PLETHOR'IC, *adj.* } contain a greater quantity of humors than is agreeable to health: plethoric is, of a full habit.

Perhaps thou labourest of some *plethory* of pride, or of some dropsy of covetousness, or of the staggers of inconstancy; it is a rare soul that has not some notable disease. *Bp. Hall.*

The diseases of the fluids are a *plethora*, or too great abundance of laudable juices. *Arbuthnot.*

The fluids, as they consist of spirit, water, salts, oil, and terrestrial parts, differ according to the redundance of the whole or of any of these; and therefore the *plethoric* are phlegmatick, oily, saline, earthy, or dry. *Id.*

In too great repletion, the elastic force of the tube throws the fluid with too great a force, and subjects the animal to the diseases depending upon a *plethory.* *Id.*

PLEURA, πλευρα, a thin membrane which lines the internal surface of the thorax, and covers its viscera. It forms a great process, the mediastinum, which divides the thorax into two cavities. Its use is to render the surface of the thorax moist by the vapor it exhales. See ANATOMY.

PLEU'RISY, *n. s.* Fr. *pleureşie;* Gr. πλευριτις; Lat. *pleuritis.*

Pleurisy is an inflammation of the pleura, though it is hardly distinguishable from an inflammation of any other part of the breast, which are all from the same cause, a stagnated blood, and are to be remedied by evacuation, suppuration, or expectoration, or all together. *Quincy.*

The viscous matter, which lies like leather upon the extravasated blood of *pleuritic* people, may be dissolved by a due degree of heat. *Arbuthnot.*

His blood was *pleuritical*, it had neither colour nor consistence. *Wiseman's Surgery.*

PLEURONECTES, in ichthyology, a genus belonging to the order of thoracici. Both eyes are on the same side of the head; there are from four to five rays in the gill membrane; the body is compressed, the one side resembling the back the other the belly. These flat fish swim sidewise, for which reason Linnæus called them pleuronectes. There are several species; the most remarkable are these:—

1. P. flesus, the flounder, inhabits every part of the British Sea, and even frequents our rivers at a great distance from the salt waters; and for this reason some writers call it the passer fluviatilis. It never grows large in our rivers, but is reckoned sweeter than those that live in the sea. It is inferior in size to the plaise, seldom or never weighing more than six pounds. It may very easily be distinguished from the plaise, or any other fish of this genus, by a row of sharp small spines that surround its upper sides, and are placed just at the junction of the fins with the body. Another row marks the side-line, and runs half way down the back. The color of the upper part of the body is a pale brown, sometimes marked with a few obscure spots of dirty yellow; the belly is white.

2. P. hippoglossus, the holibut. This is the largest of the genus; some have been taken in our seas weighing from 100 to 300 lbs.; but much larger are found in those of Newfoundland, Greenland, and Iceland, where they are taken with a hook and line in very deep water. They are part of the food of the Greenlanders, who cut them into large slips, and dry them in the sun. They are common in the London markets, where they are exposed to sale, cut into large pieces. They are very coarse eating, excepting the part which adheres to the side fins, which is extremely fat and delicious, but surfeiting. They are the most voracious of all flat fish. There have been instances of their swallowing the lead weight at the end of a line, with which the seamen were sounding the bottom from on board a ship. The holibut, in respect to its length, is the narrowest of any of this genus except the sole. It is perfectly smooth, and free from spines either above or below. The color of the upper part is dusky; beneath of a pure white.

3. P. limanda, the dab, is found with the other species, but is less common. It is in best season during February, March, and April; they spawn in May and June, and become flabby and watery the rest of summer. They are superior in quality to the plaise and flounder, but far inferior in size. It is generally of a uniform brown color on the upper side, though sometimes clouded with a darker. The scales are small and rough, which is a character of this species. The lateral line is extremely incurvated at the beginning, then goes quite straight to the tail. The lower part of the body is white.

4. P. maximus, the turbot, grows to a very large size: Pennant has seen them of twenty three pounds weight. The turbot is of a remarkable square form; the color of the upper part of the body is cinereous, marked with numbers of black spots of different sizes; the belly is white, the skin is without scales, but greatly wrinkled, and mixed with small short spines, dispersed without any order.

5. P. platessa, the plaise, very common on most of our coasts, and sometimes taken of the

weight of fifteen pounds; but it seldom attains that size, one of eight or nine pounds being reckoned a large fish. The best and largest are taken off Rye on the coast of Sussex, and also off the Dutch coasts. They spawn in the beginning of February. They are very flat, and much more square than the holibut. Behind the left eye is a row of six tubercles, that reaches to the commencement of the lateral line. The upper part of the body and fins are of a clear brown, marked with large bright orange-colored spots; the belly is white.

6. P. solea, the sole, is found on all our coasts; but those on the western shores are much superior in size to those on the north. On the former they are sometimes taken of the weight of six or seven pounds, but towards Scarborough they rarely exceed one pound; if they reach two, it is extremely uncommon. They are usually taken in the trawl-net; they keep much at the bottom, and feed on small shell-fish. It is of a form much more narrow and oblong than any other of the genus. The irides are yellow, the pupils of a bright sapphirine color; the scales are small and very rough, the upper part of the body is of a deep brown; the tip of one of the pectoral fins black, the under part of the body white, the lateral line is straight, the tail rounded at the end. It is a fish of a very delicate flavor, but the small soles are in this respect much superior to large ones. By the ancient laws of the Cinque Ports, no one was to take soles from the 1st of November to the 15th of March; neither was any body to fish from sun-setting to sun-rising, that the fish might enjoy their night food. The chief fishery for them is at Brixham in Torbay.

PLEXIPPUS AND TOXEUS, the sons of Thestius brothers of Althæa, and uncles of Meleager, who killed them, and in consequence lost his own life. See MELEAGER.

PLEXUS, among anatomists, a bundle of small vessels interwoven in the form of network; thus a congeries of vessels within the brain is called plexus choroides, reticularis, or retiformis.

PLI'ABLE, *adj.*
PLI'ABLENESS, *n. s.*
PLI'ANCY,
PLI'ANT, *adj.*
PLI'ANTNESS, *n. s.*
PLI'ERS.

Fr. *pliable, plier, pliant.* Flexible; easily bent: hence of flexible disposition or temper: pliableness and pliancy are of corresponding sense: pliant is, bending; flexible; limber; tough; and is also used metaphorically for compliant; easily persuadable: pliers, an instrument for bending wire or other works of art.

In languages the tongue is more *pliant* to all sounds, the joints more supple to all feats of activity, in youth than afterwards. *Bacon.*

Greatness of weight, closeness of parts, fixation, *pliantness* or softness. *Id. Natural History.*

God's preventing graces, which have thus fitted the soil for the kindly seeds-time, planted *pliableness*, humility in the heart. *Hammond.*

As the sword of the best tempered metal is most flexible; so the truly generous are most *pliant* and courteous to their inferiors. *Fuller.*

Particles of heavenly fire,
Or earth but new divided from the sky,
And *pliant* still retained the etherial energy. *Dryden.*

Though an act be never so sinful, they will strip it of its guilt, and make the very law so *pliable* and bending, that it shall be impossible to be broke. *South.*

Compare the ingenuous *pliableness* to virtuous counsels in youth, as it comes fresh out of the hands of nature, with the confirmed obstinacy in most sorts of sin, that is to be found in an aged sinner. *Id.*

The will was then ductile and *pliant* to right reason, it met the dictates of a clarified understanding halfway. *Id.*

Whether the different motions of the animal spirits may have any effect on the mould of the face, when the lineaments are *pliable* and tender, I shall leave to the curious. *Addison.*

Had not exercise been necessary, Nature would not have given such an activity to the limbs, and such a *pliancy* to every part, as produces those compressions and extensions necessary for the preservation of such a system. *Id. Spectator.*

An anatomist promised to dissect a woman's tongue, and examine whether the fibres may not be made up of a finer and more *pliant* thread. *Addison.*

As the wax melts that to the flame I hold,
Pliant and warm may still her heart remain,
Soft to the print, but ne'er turn hard again. *Granger.*

I made a detention by a small pair of *pliers*. *Wiseman.*

Those, who bore bulwarks on their backs,
Now practise ev'ry *pliant* gesture,
Op'ning their trunk for ev'ry tester. *Swift's Miscellanies.*

Pliers are of two sorts, flat-nosed and round-nosed; their office is to hold and fasten upon a small work, and to fit it in its place: the round-nosed *pliers* are used for turning or boring wire or small plate into a circular form. *Moxon.*

PLICA POLONICA, or plaited hair, is a disease frequent in Poland, and occurring also in Hungary, Russia, and Tartary. See MEDICINE.

PLIGHT, *v. a.* & *n. s.* Skinner derives this word from the Dutch *plicht*, office or employment; but Junius observes that Saxon pliht, signifies distress or pressing danger; whence I suppose, says Dr. Johnson, plight was derived, it being generally used in a bad sense. Rather the noun substantive seems derived from the verb, which has the sense, and was originally the preterperfect of pledge, condition; hence fix or bring into a certain state. To pledge; offer a deposit as surety or security; pawn: as a noun substantive, condition or state; case; pledge; gage.

Who abuseth his cattle and starves them for meat,
By carting or plowing his gain is not great;
Where he that with labour can use them aright,
Hath gaine to his comfort, and cattle in *plight*. *Tusser.*

He *plighted* his right hand
Unto another love, and to another land. *Spenser.*

When as the careful dwarf had told,
And made ensample of their mournful sight
Unto his master, he no longer would
There dwell in peril of like painful *plight*. *Id.*

Saint Withold
Met the night mare, and her ninefold,
Bid her alight, and her troth *plight*. *Shakspeare.*

I again in Henry's royal name,
Give thee her hand for sign of *plighted* faith. *Id.*

I think myself in better *plight* for a lender than you are. *Id.*

Beseech your highness,
My women may be with me; for, you see,
My *plight* requires it. *Id. Winter's Tale.*

Thou must not here
Lie in this miserable loathsome *plight*. *Milton.*

New love you seek,
New vows to *plight*, and *plighted* vows to break. *Dryden.*

I'll never mix my *plighted* hands with thine,
While such a cloud of mischiefs hangs about us. *Addison.*

PLIGHT, *v. a.* & *n. s.* Lat. *plico.* To weave; braid: hence a fold; pucker; and (obsolete) a garment.

Her head she fondly would aguise
With gaudie girlonds, or fresh flowrets dight
About her neck, or rings of rushes *plight*. *Spenser.*

Yclad, for fear of scorching air,
All in a silken camus, lilly white,
Purfled upon with many a folded *plight*. *Id.*

Because my wrack
Chanc't on his father's shore, he let not lack
My *plight*, or coate, or cloake, or any thing
Might cherish heat in me. *Chapman.*

I took it for a fairy vision
Of some gay creatures of the element,
That in the colours of the rainbow live,
And play i' the' *plighted* clouds. *Milton.*

PLINIA, in botany, a genus of plants of the class polyandria, and order monogynia. The empalement is divided into five segments; the flower consists of five petals; the stamina are numerous filaments, slender, and as long as the flower; the antheræ, and the germen of the pistil, are small; the style is subulated, and of the length of the stamina; the stigma is simple; the fruit is a large globose berry, of a striated or sulcated surface, containing only one cell, in which is a very large, smooth, and globose seed. There is only one species, a tree of North America.

PLINTH OF A STATUE, &c., is a base, either flat, round, or square, that serves to support it.

PLINTH OF A WALL denotes two or three rows of bricks advancing out from a wall; or, in general, a flat high moulding, that serves in a front wall to mark the floors, to sustain the eaves of a wall, or the larmier of a chimney.

PLINTH, *n. s.* Gr. πλίνθος. In architecture, that square member which serves as a foundation to the base of a pillar.

The *plinth* is used at the foot, or foundation of columns: being that flat square table, under the mouldings of the base and pedestal, at the bottom of the whole order; seeming to have been originally intended to keep the bottom of the primitive wooden pillars from rotting. *Dr. A. Rees.*

PLINY, THE ELDER, or Caius Cæcilius Plinius Secundus, one of the most learned men of ancient Rome, was descended from an illustrious family, and born at Verona. He bore arms in the German war; was one of the college of Augurs; became intendant of Spain; and was employed in several important affairs by Vespasian and Titus. While at Masenum, where he commanded the fleet, he was surprised at a sudden appearance of clouds and dust from Vesuvius. His curiosity led him to the mountain and he lodged for the night at the villa of his friend Pomponianus near its base. In the morning, however, he was compelled to fly by showers of ashes filling his apartment, and in his flight was suffocated. His nephew, Pliny the Younger, relates the circumstances of that dreadful eruption, and the death of his uncle, in a letter to Tacitus. Pliny the Elder wrote a Natural History in thirty-seven books, which is still extant, and has gone through many editions; the most esteemed of which is that of Father Hardouin, printed at Paris in 1723, in two volumes folio. The following is the mode of his spending his time at Rome, when in possession of the imperial favor. Before day-break he waited upon Vespasian, to receive and execute his orders. On returning home he employed the rest of the day in study. After taking a light repast, he reclined in the sun according to the Roman custom, while a book was read to him, from which he took notes. He never perused any work without making extracts, as he was accustomed to say 'that no book was so bad as not to afford something valuable.' He then bathed, slumbered a little, and, after rising, studied till supper time. Even during that repast a reader was at his side, as there was upon all his journeys; and a vacant hour seldom occurred which he did not employ in reading and writing.

PLINY, THE YOUNGER, nephew and adopted son of the preceding, was born in the ninth year of Nero, A. D. 62, at Novocomum. Lucius Cæcilius was the name of his father. He showed very early talents, and had the celebrated Virginius for his tutor. He frequented the schools of the rhetoricians, and heard Quintilian, for whom he ever after entertained so high an esteem that he bestowed a considerable portion upon his daughter at her marriage. He was in his eighteenth year when his uncle died; and he then began to plead in the forum. About a year after he assumed the military character, and went into Syria as tribune; but returned after a campaign or two. In his passage home he was detained by contrary winds at the island of Icaria. Upon his return from Syria, he married, and settled in Rome, in the reign of Domitian. During this most perilous time, he continued to plead in the forum, where he was distinguished no less by his uncommon abilities and eloquence, than by his resolution and courage. He was therefore often appointed by the senate to defend the plundered provinces against their oppressive governors, and to manage other causes of an important and dangerous nature. One of these was for the province of Bœtica, in their prosecution of Bæbius Massa; in which he acquired so general an applause, that the emperor Nerva, then a private man, and in banishment at Tarentum, wrote to him a letter, in which he congratulated not only Pliny, but the age which had produced an example so much in the spirit of the ancients. Pliny relates this affair in a letter to Tacitus, whom he intreats to record it in his history. He obtained the offices of quæstor and tribune, and fortunately escaped the tyranny of Domitian. But he tells us him self, that his name was afterwards found in Do-

mitian's tablets, in the list of those who were destined to destruction. He lost his wife in the beginning of Nerva's reign, and soon after married his celebrated Calphurnia, of whom we read so much in his Epistles. He had, however, no children by either of his wives. He was promoted to the consulate by Trajan in the year 100, when he was thirty-eight years of age; and in this office pronounced a panegyric, which has ever since been admired. He was then elected augur, and afterwards made proconsul of Bithynia; whence he wrote to Trajan that curious letter concerning the primitive Christians; which, with Trajan's rescript, is extant among his Epistles. Pliny's letter, as Mr. Melmoth observes in a note upon the passage, is esteemed one of the few genuine monuments of ecclesiastical antiquity relating to the times immediately succeeding the apostles, it being written at most not above forty years after the death of St. Paul. It was preserved by the Christians, as a clear and unsuspicious evidence of the purity of their doctrines, and is often appealed to by the early writers of the church against the calumnies of their adversaries. It is not known what became of Pliny after his return from Bithynia. Antiquity is also silent as to the time of his death: but it is supposed that he died about A. D. 116. He wrote and published a great number of works; but nothing has escaped the wreck of time except his Epistles and his panegyric upon Trajan. In his letters he may be considered as writing his own memoirs. Every epistle is a kind of historical sketch, wherein we have a view of him in some striking attitude. In them are also preserved anecdotes of many eminent persons, whose works have come down to us, as Suetonius, Silius Italicus, Martial, Tacitus, and Quintilian; and of curious things, which throw great light upon the history of those times. There are two elegant English translations of his Epistles; the one by Mr. Melmoth, and the other by lord Orrery.

PLISTHENES, the son of Atreus, king of Argos, and the father of Agamemnon and Menelaus, according to Hesiod and others. He died before his father, and his children were educated by their grandfather, Atreus, and hence were called Atridæ, and passed for his sons.

PLISTONAX, the son of Pausanias, one of the kings of Sparta, was general of the Lacedæmonians in the Peloponnesian war. He succeeded Plistarchus, and reigned fifty-eight years, but was banished nineteen years, till he was recalled by order of the Delphian oracle.

PLOCAMA, in botany, a genus of the monogynia order, and pentandria class of plants: CAL. quinquedentate: fruit a berry and trilocular, with solitary seeds. There is only one species; a native of the Canaries.

PLOCE, in music, Lat. nexus; a species of writing, among the ancients, consisting of a succession of disjointed or diatonic passages. Ascending passages were termed nexus or ductus rectus; descending ones were termed nexus anacamptos, or ductus reversus; ascending and descending passages, nexus circumstans, or ductus circumcurrens.

PLOCK, one of the eight palatinates of the present kingdom of Poland, comprises the north and north-west of the kingdom, and lies entirely to the right of the Vistula and the Bug, extending from the Russian frontier to the vicinity of Thorn. Its area is flat but fertile, and calculated at about 7400 square miles. It includesthe ancient palatinate of this name, with considerable additional territory. Its climate and products differ in no respect from those of the north of Poland in general. The chief rivers are the Vistula and the Narew. Inhabitants 320,000.

PLOCK, or PLOTZK, the chief place of the preceding palatinate, is a bishop's see, situated on the Vistula, in the midst of orchards. It has also a college of Piarists, and 3000 inhabitants. Fifty-five miles W. N. W. of Warsaw.

PLOD, *v. n.* } Dutch *ploeghen.* Skinner.
PLOD'DER, *n. s.* } To toil; drudge; pore; travel.

Rogues, *plod* away a' the hoof, seek shelter, pack.
Shakspeare.

If one of mean affairs
May *plod* it in a week, why may not I
Glide thither in a day? *Id. Cymbeline.*

Hast thou not held my stirrup?
Bare-headed, *plodded* by my foot-cloth mule,
And thought thee happy when I shook my head?
Shakspeare.

Universal *plodding* prisons up
The nimble spirits in the arteries;
As motion and long-during action tires
The sinewy vigour of the traveller. *Id.*

Study is like the heaven's glorious sun,
That will not be deep searched with saucy looks;
What have continual *plodders* ever won,
Save base authority from others' books? *Id.*

He *plods* to turn his amorous suit
T' a plea in law, and prosecute. *Hudibras.*

The unlettered Christian, who believes in gross,
Plods on to heaven, and ne'er is at a loss. *Dryden.*

A *plodding* diligence brings us sooner to our journey's end, than a fluttering way of advancing by starts. *L'Estrange.*

She reasoned without *plodding* long,
Nor ever gave her judgment wrong.
Swift's Miscellanies.

Some stupid, *plodding*, money-loving wight,
Who wins their hearts by knowing black from white.
Young.

The curfew tolls the knell of parting day,
The lowing herds wind slowly o'er the lea,
The ploughman homeward *plods* his weary way,
And leaves the world to darkness and to me.
Gray's Elegy.

PLOEN, a town of the duchy of Holstein, Denmark, situated between a large and a small lake. It has an elegant palace, formerly the residence of the dukes of Holstein-Ploen, a branch of the royal family of Denmark. Inhabitants 2000. Eighteen miles S. S. E. of Kiel, and twenty-two north by west of Lubeck.

PLOMBIERES, a post town of the department of the Vosges, France, the chief place of a canton in the arrondissement of Remiremont, containing about 1300 inhabitants. It stands in a very picturesque situation, between two steep mountains at the bottom of a valley crossed by the Angronne. It is generally well built, and has some fine walks round it, varied with beautiful scenery. Here are a fine church and an hospital, founded by Stanislaus, king of Poland, to

whom this town is indebted for many of its embellishments. Plombieres is celebrated for its mineral and warm springs, which have acquired a very extensive reputation. These springs appear to have been known to the Romans, and for several centuries they have been frequented by invalids from all parts of the world. There are four distinct baths supplied from different springs; the temperature varies from 32° to 56°. There are besides these two saponaceous springs, one iron, and several vapor stoves. These waters are used for drinking, washing, and bathing; they are very clear and colorless, without any peculiar taste. They are chiefly beneficial in palsy and external pains, obstinate ulcers, and cutaneous disorders, and are taken from the month of May to the end of September. There are manufactories of cutlery here and other articles of iron and polished steel, tool and nail factories, cotton-spinning mills, paper-mills, forges, &c. A trade is carried on in cherry-water. Plombieres is twelve miles south-west of Remiremont, fifteen N. N. E. of Luxeuil, fifty-four west of Bourbonne, and 309 E. S. E. of Paris.

PLOMO, in metallurgy, is a name given by the Spaniards, who have the care of the silver mines, to the silver ore when found adhering to the surface of stones, and when it incrusts their cracks and cavities like small grains of gun-powder. Though these grains are few in number, and the rest of the stone has no silver in it, yet they are esteemed a certain token that there is a rich vein near it. And if in digging forwards they still meet with these grains, or the plomo in greater quantity, it is a certain sign that they are getting nearer to the rich vein.

PLOT, *n. s.*, *v. n.*, & *v. a.* } Or PLAT, which
PLOTTER, *n. s.* } see. Sax. plat. A small piece of ground; a plantation: hence plan; scheme; and hence (or from Fr. *complot*) a conspiracy; intrigue: to form mischievous schemes; contrive; to plan in any way; describe ichnographically: a plotter is, a contriver; conspirator; schemer.

The wicked *plotteth* against the just.
Psalm XXXVII.

Plant ye with alders or willowes a *plot*,
Where yeerely as needeth mo poles may be got.
Tusser.

Some goddess inhabiteth this region, who is the soul of this soil; for neither is any less than a goddess, worthy to be shrined in such a heap of pleasures; nor any less than a goddess could have made it so perfect a *plot*. *Sidney.*

It was a chosen *plot* of fertile land,
Amongst wide waves set like a little nest,
As if it had by nature's cunning hand
Been choicely picked out from all the rest.
Spenser.

The law of England never was properly applied unto the Irish nation, as by a purposed *plot* of government, but as they could insinuate and steal themselves under the same by their humble carriage.
Id. on Ireland.

Many unfrequented *plots* there are,
Fitted by kind for rape and villany.
Shakspeare.

Were there but this single *plot* to lose,
This mould of Marcius, they to dust would grind it,
And throw't against the wind. *Id.*

When we mean to build,
We first survey the *plot*, then draw the model,
And when we see the figure of the house,
Then we must rate the cost of the erection. *Id.*

I have o'erheard a *plot* of death upon him. *Id.*

The subtle traitor
This day had *plotted* in the council house
To murther me. *Id. Henry III.*

An irreligious Moor,
Chief architect and *plotter* of their woes.
Shakspeare.

This liketh moory *plots*, delights in sedgy bowers.
Drayton.

The count tells the marquis of a flying noise, that the prince did *plot* to be secretly gone; to which the marquis answered, that though love had made his highness steal out of his country, yet fear would never make him run out of Spain. *Wotton.*

This treatise *plotteth* down Cornwall, as it now standeth, for the particulars.
Carew's Survey of Cornwall.

Easy seems the thing to every one,
That nought could cross their *plot* or them suppress.
Daniel.

Who says he was not
A man of much *plot*,
May repent that false accusation;
Having *plotted* and penned
Six plays to attend
The farce of his negociation. *Denham.*

Frustrate all our *plots* and wiles. *Milton.*

He who envies now thy state,
Who now is *plotting* how he may seduce
Thee from obedience. *Milton's Paradise Lost.*

Nothing must be sung between the acts,
But what some way conduces to the *plot*.
Roscommon.

The wolf that round the' inclosure prowled
To leap the fence, now *plots* not on the fold.
Dryden.

With shame and sorrow filled;
Shame for his folly; sorrow out of time
For *plotting* an unprofitable crime. *Id.*

Colonel, we shall try who's the greater *plotter* of us two; I against the state, or you against the petticoat. *Id.*

Weeds grow not in the wild uncultivated waste, but in garden *plots* under the negligent hand of a gardener. *Locke.*

O think what anxious moments pass between
The birth of *plots*, and their last fatal periods!
O 'tis a dreadful interval of time,
Made up of horrour all, and big with death!
Addison.

They deny the *plot* to be tragical, because its catastrophe is a wedding, which hath ever been accounted comical. *Gay.*

Our author
Produced his play, and begged the knight's advice,
Made him observe the subject and the *plot*,
The manners, passions, unities, what not? *Pope.*

If the *plot* or intrigue must be natural, and such as springs from the subject, then the winding up of the *plot* must be a probable consequence of all that went before. *Id.*

PLOT (Robert), LL.D., a learned antiquarian and philosopher, born at Sutton-barn, in the parish of Borden in Kent, in 1641. He studied in Magdalen Hall, and afterwards in University College, Oxford. In 1682 he was elected secretary of the Royal Society, and published the Philosophical Transactions from No. 143 to No. 166 inclusive. The next year Elias Ashmole, Esq., appointed him first keeper of his

museum, and about the same time the vice-chancellor nominated him first professor of chemistry in the university of Oxford. In 1687 he was made secretary to the earl marshal, and in 1688 historiographer to king James II. In 1690 he resigned his professorship of chemistry, and also his place of keeper of the museum, to which he presented a very large collection of natural curiosities; which were those he had described in the histories of Oxfordshire and Staffordshire; the former published at Oxford in 1677, folio; reprinted with additions and corrections in 1705; the latter in the same size in 1686. In January 1694-5, Henry Howard, earl Marshal, nominated him Mowbray-herald extraordinary; and, on the 30th of April 1696, he died of the stone at his house in Borden. Amongst several MSS. which he left were large materials for the Natural History of Kent, Middlesex, and London. He also published De origine fontium tentamen philosophicum, 8vo.; and nine papers in the Philosophical Transactions.

PLOTINA POMPEIA, a Roman lady who was married to the emperor Trajan, when he was in a private station. She accompanied him and shared his honors when he was elected emperor, and became celebrated for her humanity, affability, and liberality to the poor. She accompanied Trajan in his expedition to the east, and on his death brought back his ashes to Rome, where she was treated by Adrian with all the honors due to her dignity and virtue. She died A. D. 122.

PLOTINUS, a Platonic philosopher of the third century, born at Licopolis, in Egypt, A. D. 204. He attended some of the most famous professors of philosophy in Alexandria. But, upon hearing Ammonius, he became so fond of his system, that he studied under him for eleven years. He then travelled for farther improvement into Persia and India, and followed the Roman army, in 243, when the emperor Gordian set out on his unfortunate expedition against the Persians, in which he lost his life, and our philosopher narrowly escaped sharing his fate. In 244 he returned to Rome, where he read philosophical lectures, which were attended by people of all ranks, patricians and plebeians, and rendered him very popular. Among other learned pupils, the celebrated Porphyry attended him six years; and his reputation for integrity and virtue, as well as learning, became so great, that his arbitration was often applied for, to decide or prevent law-suits; and many persons of property, when dying, left their children to his tutorage, and their estates to his care. The emperor Gallienus and his empress Salonina had so great esteem for him, that they once intended to rebuild the city of Campania, and assign it over, with its territory, to Plotinus, to be colonised by a set of philosophers, upon the plan of Plato's republic; but were dissuaded by some of the courtiers. The philosophical opinions of Plotinus were rather remarkable. He not only entertained the utmost contempt for all terrestrial enjoyments, but despised matter so philosophically, that he was ashamed that his soul was obliged to be lodged in a body, which he considered as a prison. From this principle he lived very abstemiously, and slept very little, and hence there is reason to believe his brain was in some degree affected; for, though a Pagan to the end of his life, he pretended to many of those visions and illuminations by the Deity, which the superstitious devotees in all ages and religions have boasted of. In short he boasted that he not only had a familiar dæmon or angel, like Socrates, but that he had even often been united to the Deity himself. Yet of this Deity he appears to have entertained very confused notions. Full of romantic metaphysical ideas and uncertaintities, he died, A. D. 570, aged sixty-six, with these words:—'I am laboring with all my might to return the divine part of me to that Divine Whole which fills the universe!' He left fifty-four treatises on various subjects, which his disciple Porphyry collected and arranged in six Enneades, or volumes, of nine tracts each; and published with his life. Marsilius Ficinus, at the desire of Cosmo de Medicis, translated this work into Latin, which was published at Basil in 1559, and reprinted along with the Greek in 1580, folio.

PLOTIUS TUCCA, a learned Roman, who flourished in the Augustan age, and was intimate with the literati of that dignified period. He was particularly the friend of Horace, Mæcenas, and with Virgil, who left him his heir. Augustus appointed him, together with Varius, to review Virgil's Æneid.

PLOTUS, or darter, in ornithology, a genus of birds belonging to the order palmipedes. The bill is long and sharp-pointed; the nostrils are merely a long slit placed near the base; the face and the chin are bare of feathers; the neck is very long, and the legs are short. They have four toes webbed together.

1. P. anhinga, the white-bellied darter, is not quite so big as a mallard; but its length from the point of the bill to the end of the tail is ten inches. The bill is three inches long, straight and pointed, the color is grayish, with a yellowish base, the neck long and slender, the upper part of the back and scapulars are of a dusky black color, the middle of the feathers is dashed with white, the lower part of the back, &c., is of a fine black color, the under parts from the breast are silvery white, the smaller wing-coverts and those in the middle are dusky black, the larger ones are spotted with white, and the outer ones are plain black, the tail-feathers are twelve, broad, long, and glossy black, the legs and toes are of a yellowish-gray. This species inhabit Brasil, and are exceedingly expert in catching fish. Like the cormorant, they build nests on trees, and roost in them at night. They are scarcely ever seen on the ground; being always on the highest branches of trees on the water, or such as grow in the moist savannas on river sides. When at rest, they sit with the neck drawn in between the shoulders like the heron. The flesh is in general very fat, but has an oily, rank, and disagreeable taste, like that of a gull.

2. P. Cayennensis, the anhinga of Cayenne, black-bellied anhinga, is as large as a common duck, with a very long neck and a long sharp-pointed straight bill. The upper part of the bill is of a pale blue, and the lower is reddish;

the eyes are very piercing, the head, neck, and upper part of the breast are light brown; both sides of the head and the upper part of the neck are marked with a broad white line; the back, scapulars, and wing-coverts, are marked with black and white stripes lengthwise, in equal portions; the quill-feathers, the belly, thighs, and tail, are of a deep black color, the tail is very long and slender, the legs and feet are of a pale green color, and the four toes, like those of the cormorant, are united by webs. This species is found in Ceylon and Java. They generally sit on the shrubs that hang over the water, and, when they shoot out their long slender necks, are often taken for serpents at first sight. Latham describes three varieties of this species, which are all equal in size to the common birds of the species. The first and the second varieties, which last Latham calls the black darter, inhabit Cayenne; and the third, or rufous darter, inhabits Africa, particularly Senegal, where it is called kandar.

3. P. Surinensis, the Surinam darter, is about thirteen inches long, being about the size of a teal. The bill is of a pale color, and about one inch and one-eighth in length; the irides are red, the crown of the head is black, and the feathers behind form a sort of crest; the neck, as in the other species, is long and slender; the cheeks are of a bright bay color; from the corner of each eye there comes in a line of white; the sides and back part of the neck are marked with longitudinal lines of black and white; the wings are black, and the tail is dusky brown; it is also tipped with white, and shaped like a wedge; the breast and belly are white; the legs short, but very strong, and of a pale dusky color; the four toes are joined by a membrane, and barred with black. This species inhabits Surinam, frequenting the sides of rivers and creeks, where it feeds on small fish and insects, especially on flies, which it catches with great dexterity. When domesticated, which often happens, the inhabitants call it the sun-bird. Authors have differed exceedingly concerning the genus to which this species belongs, as it is found to differ from the others in some pretty essential characters; it agrees, however, in so many, and those the most essential, as sufficiently to authorise classing it with this genus.

PLOV'ER, *n. s.* Fr. *pluvier;* Lat. *pluvialis.* A lapwing; a bird.

Of wild birds, Cornwall hath quail, rail, partridge, pheasant, and *plover.*
Carew's Survey of Cornwall.

Scarce
The bittern knows his time: or, from his shore,
The *plovers* when to scatter o'er the heath
And sing. *Thomson's Spring.*

PLOVER. See CHARADRIUS.

PLOUGH, *n. s., v. n., & v. a.*
PLOUGH'-BOY, *n. s.*
PLOUGH'ER,
PLOUGH'-LANDS,
PLOUGH'-MEN,
PLOUGH'-MONDAY,
PLOUGH'-SHARE.
Sax. ploȝ; Belg. *ploegen;* Gothic *ploja;* Swed. *ploya.* The agricultural instrument for cutting furrows; a kind of plane used by carpenters: to turn up the ground in order to sow; practise ploughing: to turn up, or bring to view by the plough; to furrow; divide; tear: plough-land is land suited to the plough, or for corn; for plough-monday, see below: the other compounds the extracts explain.

No man that puttith his hond to the *plow* and bihodyng bacward is able to the rewme of God.
Wiclif. Luke ix.

Plough-monday next after that the twelftide is past,
Bids out with the *plough,* the worst husband is last.
Tusser.

As the earth was turned up the *ploughshare* lighted upon a great stone; we pulled that up, and so found some pretty things. *Sidney.*

When the country shall be replenished with corn, as it will, if well fallowed; for the country people themselves are great *ploughers* and small spenders of corn: then there should be good store of magazines erected. *Spenser.*

Rebellion, insolence, sedition,
We ourselves have *ploughed* for, sowed and scattered,
By mingling them with us. *Shakspeare. Coriolanus.*

Let the Volscians
Plough Rome and harrow Italy. *Id.*

Let
Patient Octavia *plough* thy visage up
With her prepared nails.
Id. Antony and Cleopatra.

When shepherds pipe on oaten straws,
And merry larks are *ploughmen's* clocks,
The cuckoo then on every tree. *Shakspeare.*

Who hath a *ploughland* casts all his seed corn there,
And yet allows his ground more corn should bear.
Donne.

Till the' out-lawed Cyclops' land we fetcht; a race
Of proud-lined loiterers, that never sow,
Nor put a plant in earth, nor use a *plough.*
Chapman.

Look how the purple flower, which the *plough*
Hath shorn in sunder, languishing doth die.
Peacham.

God provides the good things of the world, to serve the needs of nature by the labours of the *ploughman.* *Taylor.*

The careful *ploughman* doubting stands. *Milton.*

In this book are entered the names of the manors or inhabited townships, the number of *ploughlands* that each contains, and the number of the inhabitants. *Hale.*

Your reign no less assures the *ploughman's* peace,
Than the warm sun advances his increase. *Waller.*

The merchant gains by peace, and the soldiers by war, the shepherd by wet seasons and the *ploughmen* by dry. *Temple.*

Should any slave, so lewd, belong to you;
No doubt you'd send the rogue, in fetters bound,
To work in Bridewell, or to *plough* your ground.
Dryden.

Who can cease t'admire
The *ploughman* consul in his coarse attire? *Id.*

Some *ploughs* differ in the length and shape of their beams; some in the share, others in the coulter and handles. *Mortimer.*

They only give the land one *ploughing,* and sow white oats, and harrow them as they do black. *Id.*

You find it *ploughed* into ridges and furrows.
Id.

The pretty innocent walks blindfold among burning *ploughshares* without being scorched. *Addison.*

When the prince her funeral rites had paid,
He *ploughed* the Tyrrhene seas with sails displayed.
Id.

A weak stomach will turn rye bread into vinegar, and a *ploughman* will digest it.

Arbuthnot on Aliments.

Another of a dusky color, near black; there are of these frequently *ploughed* up in the fields of Weldon. *Woodward.*

With speed we *plough* the watery way,
My power shall guard thee. *Pope's Odyssey.*

A *ploughboy* that has never seen any thing but thatched houses, and his parish church, imagines that thatch belongs to the very nature of a house.

Watts's Logick.

In ancient times the sacred *plough* employed
The kings and awful fathers. *Thomson.*

At the *plough*, scythe, or reap-hook, I feared no competitor, and thus I set absolute want at defiance; and, as I never cared farther for my labours than while I was in actual exercise, I spent the evenings in the way after my own heart. *Burns.*

Peace be to those (such peace as earth can give)
Who live in pleasure (dead e'en while they live);
Born capable indeed of heavenly truth;
But down to latest age, from earliest youth,
Their mind a wilderness through want of care,
The *plough* of wisdom never entering there. *Cowper.*

PLOUGH is by others defined, a machine for turning up the soil by the action of cattle, contrived to save the time, labor, and expense, which, without this instrument, must have been employed in digging the ground, and fitting it for receiving all sorts of seeds. See RURAL ECONOMY.

PLOUGH MONDAY, the first Monday after Twelfth-day, appears to have received this name because it was the first day after Christmas that husbandmen resumed the plough. In some of the northern and midland counties they still draw the plough on this day in procession to the doors of the villagers and towns-people. Long ropes are attached to it, and thirty or forty men, stripped to their clean white shirts, but protected from the weather by waistcoats beneath, drag it along. Their arms and shoulders are decorated with gay-colored ribands, tied in large knots and bows, and their hats are smartened in the same way. They are usually accompanied by an old woman, or a boy dressed up to represent one; she is gaily bedizened, and called the Bessy. Sometimes the sport is assisted by a humorous countryman to represent a fool. He is covered with ribands, and attired in skins, with a depending tail, and carries a box to collect money from the spectators. They are attended by music, and Morris-dancers when they can be got; but there is always a sportive dance with a few lasses in all their finery, and a superabundance of ribands. When this merriment is well managed it is very pleasing. The money collected is spent at night in conviviality.

Blomfield's History of Norfolk tends to clear the origin of these annual processions. Anciently, a light called the plough-light, was maintained by old and young persons who were husbandmen, before images in some churches, and on Plough Monday they had a feast, and went about with a plough and dancers to get money to support the plough-light. The reformation put out these lights; but the practice of going about with the plough begging for money remains, and the 'money for light' increases the income of the village alehouse.

PLOWDEN (Edmund), serjeant at law, the son of Humphrey Plowden of Plowden, in Shropshire, of an ancient and genteel family. He was first a student at the university of Cambridge, where he studied philosophy and medicine for three years. He then removed to Oxford, where, having studied about four years more, in 1552 he was admitted to the practice of physic and surgery; but afterwards gave up both, entered the Middle Temple, and began to study the law. Wood says, that in 1557 he was summer reader to that society, and Lent reader three years after, being then serjeant. He died in 1584, aged sixty-seven. He married the daughter of William Sheldon, of Boley, in Worcestershire; by whom he had a son, who died soon after his father. He wrote, 1. Commentaries or Reports of divers Cases, &c., in the reigns of king Edward VI., queen Mary, and queen Elizabeth, London, 1571, &c., in the old Norman language. 2. Queries, or a Moot-book of cases, &c., translated, methodised, and enlarged, by H. B. of Lincoln's Inn, London, 1662, 8vo.

PLUCHE (Antony), an elegant writer, born at Rheims in 1688, who obtained by his engaging manners and proficiency in the belles lettres the appointment of humanist in the university of that city. Two years after he obtained the professor of rhetoric's chair, and was admitted into holy orders. Clermont, bishop of Laon, informed of his talents, gave him the direction of the college of his episcopal city; but some particular political opinions obliged him to resign his office. The intendant of Rouen, at the request of the celebrated Rollin, entrusted him with the education of his son. After having left Rouen he went to Paris, where, by the patronage of some literary friends, and his own writings, he acquired great reputation. He published, 1. Le Spectacle de la Nature (Nature Displayed), in 9 vols. in 12mo., a work equally instructive and entertaining. 2. Histoire du Ciel, or History of the Heavens, in 2 vols. in 12mo., in two parts. 3. De Linguarum artificio; a work which he translated with this title, La Mecanique des Langues, in 12mo. 4. Harmony of the Psalms and the Gospel, or a Translation of the Psalms and Hymns of the Church, with notes relative to the Vulgate, the Septuagint, and Hebrew Text; Paris, 1764, 12mo. In 1749 abbé Pluche retired to Varenne, St. Maure, where he gave himself entirely up to devotion and study, and where he died of an apoplexy, on the 20th of November 1761, aged seventy-three.

PLUCK, *v. a.* & *n. s.* } Saxon ploccian,
PLUCKER, *n. s.* } lyccan; Teut. *pflucken;* Belg. *plocken.* To pull with violence; snatch; draw; force up or down; strip of plumage; it has various adjuncts as *away, down, oft, on, up,* &c. 'To pluck up heart or spirit,' is a proverbial expression for taking up or resuming courage: as a noun substance a pull; art of plucking: a plucker is one who pulls violently or plucks.

Pluck away his crop with his feathers.

Leviticus.

I will *pluck* them *up* by the roots out of my land.

2 Chronicles.

They *pluck off* their skin from off them. *Micah.*

It seemed better unto that noble king to plant a peaceable government among them, than by violent means to *pluck* them under. *Spenser on Ireland.*

He willed them to *pluck up* their hearts, and make all things ready for a new assault, wherein he expected they should with courageous resolution recompense their late cowardice. *Knolles.*

You were crowned before,
And that high royalty was ne'er *plucked off.*
Shakspeare.

Pluck down my officers, break my decrees,
For now a time is come to mock at form. *Id*
Canst thou not
Pluck from the memory a rooted sorrow,
And with some sweet oblivious antidote
Cleanse the stuffed bosom. *Id. Macbeth.*

I gave my love a ring ;
He would not *pluck* it from his finger, for the wealth
That the world masters. *Id. Merchant of Venice.*

If you do wrongfully seize Hereford's right,
You *pluck* a thousand dangers *on* your head.
Shakspeare.

Since I *plucked* geese I knew not what it was to be beaten. *Id.*

I come to thee from plume-*plucked* Richard. *Id.*

Thou setter up and *plucker* down of kings ! *Id.*

Birds kept coming and going all day; but so few at a time that the man did not think them worth a *pluck.* *L'Estrange.*

Pull it as soon as you see the seed begin to grow brown, at which time let the *pluckers* tie it up in handfuls. *Mortimer.*

Were the ends of the bones dry, they could not, without great difficulty, obey the *plucks* and attractions of the motory muscles. *Ray on the Creation.*

Dispatch 'em quick, but first *pluck out* their tongues,
Lest with their dying breath they sow sedition.
Addison.

Beneath this shade the weary peasant lies,
Plucks the broad leaf, and bids the breezes rise.
Gay.

From the back
Of herds and flocks, a thousand tugging bills
Pluck hair and wool. *Thomson's Spring.*

E'en children followed with endearing wile,
And *plucked* his gown to share the good man's smile.
Goldsmith.

Hope, with uplifted foot set free from earth,
Pants for the place of her ethereal birth,
On steady wings sails through the' immense abyss,
Plucks amaranthine joys from bowers of bliss,
And crowns the soul. *Cowper.*

Pluck, *n. s.* Goth. *lugu* ; Erse *plughk*. The heart, liver, and lights of an animal.

PLUG, *n. s.* & *v. a.* Swed. *plugg* ; Belg. *plugg* ; Teut. *plock*. A stopple ; any thing driven into a vessel to stop a hole ; to stop up a hole.

Shutting the valve with the *plug*, draw down the sucker to the bottom. *Boyle.*

The fighting with a man's own shadow, consists in the brandishing of two sticks grasped in each hand, and loaden with *plugs* of lead at either end : this opens the chest. *Addison.*

A tent *plugging* up the orifice, would make the matter recur to the part disposed to receive it.
Sharp's Surgery.

In bottling wine fill your mouth full of corks, together with a large *plug* of tobacco. *Swift.*

Plugs, in naval affairs, pieces of timber, formed like the frustum of a cone, and used to stop the hawse-holes and the breaches made in the body of a ship by cannon balls ; the former are called hawse plugs, the latter shot plugs, and are formed of various sizes, in proportion to the holes made by the different sizes of shot, which may penetrate the ship's sides or bottom in battle. They are always kept ready for this purpose.

PLUKENET (Leonard), an English physician, born in 1642, one of the most excellent and laborious botanists of any age. He was author of Phytographia Plucenetiana, a work much esteemed ; Almagesticum Britannicum ; and other works of the kind, on which he spent the greatest part of his life and fortune. He was appointed superintendant of the garden at Hampton Court, by Charles II., with the title of royal professor of botany. He died about 1706. His Opera Botanica, with cuts, were printed at London in 6 vols. folio, in 1720.

PLUKENETIA, in botany, a genus of the monadelphia order, and monœcia class of plants ; natural order thirty-eighth, tricoccæ.

PLUM, *n. s.*
Plum-porridge, } Sax. þlum, þlumtreoþ ; Dan. *blumme*. (Perhaps, says Mr. Thomson, from what we call its bloom or blue color). Improperly written plumb. A fruit with a stone. See Prunus. In the cant of the city, as Johnson says, a hundred thousand pounds. A porridge made with plums.

I will dance, and eat *plums* at your wedding.
Shakspeare.

He crammed them till their guts did ache
With caudle, custard, and *plumcake*. *Hudibras.*

Philosophers in vain enquired, whether the summum bonum consisted in riches, bodily delights, virtue, or contemplation ? They might as reasonably have disputed whether the best relish were in apples, *plums*, or nuts ? *Locke.*

A rigid dissenter, who dined at his house on Christmas-day, eat very plentifully of his *plum-porridge.* *Addison.*

By the present edict, many a man in France will swell into a *plum*, who fell several thousand pounds short of it the day before. *Id.*

The miser must make up his *plum*,
And dares not touch the hoarded sum. *Prior.*

By fair dealing John had acquired some *plums*, which he might have kept, had it not been for his law-suit. *Arbuthnot.*

Every eye is fixed on my countenance to enjoy the transports which I am expected to discover at the entrance of a *plum-pudding* of immoderate size ; half of which is immediately transferred to my plate.
Canning.

Plum, Bay. See Psidium.

Plum, Brasilian. See Spondias.

Plum, Black Thorn or Sloe. See Prunus.

Plum-tree, in botany. See Prunus.

PLUMAGE. See Plume.

PLUMB, *n. s.*, *adv.*, & *v. a.*
Plumb-line,
Plumber,
Plumbery. } Fr. *plomb* ; Latin *plumbum*. A plummet ; a weight let down at the end of a line ; perpendicularly ; to sound, search, or measure with a plumb : for the work of the plumber and plumbery, see below.

Behold I will set a *plumb-line* in the midst of my people Israel. *Amos* vii, 8.

He meets
A vast vacuity, all unawares
Fluttering his pennons vain, *plumb* down he falls.
Milton.

If all these atoms should descend, *plumb* down

with equal velocity, being all perfectly solid and imporous, and the vacuum not resisting their motion, they would never the one overtake the other. *Ray.*

If the *plumb-line* hang just upon the perpendicular, when the level is set flat down upon the work, the work is level. *Moxon.*

Is it not a sad thing to fall thus *plumb* into the grave? well one minute, and dead the next. *Collier.*

The most experienced seamen *plumbed* the depth of the channel. *Swift.*

PLUMB ISLAND, an island in the Atlantic, near the coast of Massachusetts, between Newburyport and Ipswich; nine miles long, and one broad. Its south end is on the north of the entrance of Ipswich harbour, and its north end on the south of the entrance of Newburyport. Near the north end there are two lights. Several houses have been erected on this island by the Marine and Humane Society. There is also an elegant hotel about a mile south of the lights. A bridge has been built across Plumb Island River, and an excellent road has been made from Newburyport to the island, a distance of three miles. This island is a place of much resort in the summer. Also, a small island near the northeast coast of Long Island, in the state of New York. It is annexed to Southold.

PLUMB LINE, among artificers, denotes a perpendicular to the horizon; so called, as being commonly extended by means of a plummet.

PLUMBAGO, in botany, lead-wort, a genus of the monogynia order, and pentandria class of plants. There are four species; the most remarkable are

1. P. Europæa. It grows naturally in the south of Europe, and has a perennial root striking deep into the ground. There are many slender channelled stalks, about three feet high, terminated by tufts of small funnel-shaped flowers, of a blue or white color. It is propagated by seeds, and by parting the roots.

2. P. Zeylonica grows naturally in both the Indies. The upper part of the stalk and empalement is covered with a glutinous juice, which catches the small flies that light upon it. It is too tender to thrive in the open air in this country.

PLUMBAGO, in chemistry and mineralogy, carburet of iron, graphite of Werner, and fercarbure of Haüy, a species of mineral carbon, of a dark iron gray or black color, occurring in masses in kidney-shaped lumps, and disseminated. It has a glistening metallic lustre; its fracture is small, somewhat curved, foliated, approaching to scaly, or granular uneven. It occurs generally in granular or scaly distinct concretions; takes a polish by cutting or rubbing; gives a dark lead-gray streak, and is unctuous to the feel, soft, and not very brittle. Spec. grav. 1·98 to 2·26. It does not flame when heated, nor can it by itself support combustion. After long exposure to a high heat in a muffle its carbon is burnt off, and its earthy and metallic part remains behind. If one part of plumbago, and two of very caustic dry alkaline, be heated in a retort with the pneumato-chemical apparatus, the alkaline becomes effervescent, hydrogen gas is obtained, and the plumbago disappears. This experiment proves that the small quantity of water contained in the salt is decomposed, and that its oxygen, by combining with the carbon of plumbago, forms the carbonic acid.

The purer kind of plumbago, according to Scheele and Berthollet, consists of about ninety per cent. of carbon and ten of iron. An impure kind from Pluffier afforded Vauquelin of twenty-three carbon, two iron, thirty-seven alumine, thirty-eight silex.

Mr. Maculloch asserts that a certain portion of plumbago often found in pig-iron adds considerably to its toughness. On one occasion in particular he mentions that a cannon had been condemned for some fault in the bore, and it was found to be so exceedingly tough that none of the men were able to break off a trunnion, as is the usual practice in these cases, when three or four blows of the sledge were commonly found sufficient for this purpose. 'I was particularly induced therefore,' says Mr. Maculloch, 'to examine this specimen, and was surprised to find that it not only contained a most unusual proportion of plumbago, but that this was in what I may call a disengaged state, for want of a better term. The plumbago was not only visible on breaking the metal, giving it the appearance of having been rubbed with powdered black lead, but the iron was capable of leaving its trace on paper. I have neither before nor since ever met with another example of this kind. The remaining guns of this lot, which must have been made of the same metal, went on service, and some of them are probably still existing. I have no doubt that they were the best that we received during the war; and it would have been very desirable to have discovered by what means this very uncommon specimen of gun-metal had been procured, as its toughness is a matter of such importance. It was from Mr. Walker's foundery. I do not pretend to account for this singular state of the iron; as, although the presence of plumbago is sufficient to affect the color of the metal, it is never, bating this instance, distinctly visible, as far as my experience goes. Yet, in gun-metal it is easy to conjecture its presence and proportion by the color of the fracture; which is darkest or most gray where it is most abundant. The trials which I have made also go to prove that the grayest metal is the toughest; although I know that many iron-founders consider that gun-metal may be too gray, and act on this principle in the assortment of the pigs for the reverberatory.'

Much of the attention of modern chemists has been excited by a curious apparent conversion of pig and cast iron into plumbago. It has been more particularly exhibited in the pipes in porter-breweries and calico-printing houses, and in those of gas-manufactories. The writer of this article has in his possession a portion of a pipe that was used for seventeen years and a half by one of these gas-houses, and that now exhibits every character of black-lead. The most remarkable quality of this is, that, on its first exposure to the air, its heat was sufficient to evaporate the moisture on its surface with rapidity, and increased till it became impossible to hold it. The following is another of many instances of the same description:—

After captain Roe had invented the diving-bell, he joined Sir Archibald Grant, a great speculator of that day in coal-mines and other matters, in an attempt to weigh the Florida, one of the Spanish Armada, which had foundered off the coast of Mull, near the entrance of Tobermory harbour. This attempt, which took place in 1740, was unsuccessful, as far as related to the ship; but some guns, both of brass and iron, were brought up. The former, whether they belonged to the Spanish vessel or not, had the mark of an English founder, R. and J. Philips, 1584, with a crown and E. R. on them. The iron guns were deeply corroded, and, on scraping them, it was said that they were found so hot that they could not be touched, and that they did not become cool till they had been two or three hours exposed to the air.

The astonishment of the Highlanders on finding guns still hot, after having been more than a century under water, may easily be imagined; and it is not surprising that the story was not believed and that not being believed, it was forgotten. This may afford us a useful hint on the subject of physical incredulity: since assuredly a fact thus nakedly stated, without a knowledge of the explanation here given, must have been pronounced impossible by every one, chemist or not. The blackest pig-metal appears to yield the greatest quantity of black lead, and in the most solid state. When the experiment is complete, the produce equals the iron in bulk, and is a solid mass, capable of being cut by a knife, even into pencils; but, it is of a much more coarse grain, or scaly granular texture, than any natural black lead that has occurred to me.

To procure it in perfection, the acid should be very weak, and the operation is then necessarily very tedious. Acetous acid appears to be the best, and it is by this that it is produced in porter-backs, in the waste-pipes of breweries, and in calico printing-houses, where sour paste is employed. The process by water is insufferably tedious.

If the experiment is perfect, the black lead becomes hot on exposure to air, smoking while there is any moisture to be evaporated.

Thus black lead is an oxide of plumbago, or of carbon, if we choose to use this term for the presumed element. It is scarcely necessary to say that the metallic nature of the base of charcoal is proved by the same experiment; nor that iron is not a necessary ingredient in black lead. The best kinds, indeed, are those which contain least.

This experiment, and these conclusions, would be much more satisfactory, if we could produce the metal of black lead in its separate state. No method of doing that has yet occurred to any one; and it will probably be found a very difficult problem, as this is evidently a highly combustible substance. But chemistry does so much every day that once appeared hopeless, that we have no reason to despair.

Plumbago was formerly supposed absolutely infusible, but professor Selleman having succeeded in fusing and volatilising charcoal by Dr. Hare's Galvanic Deflagrator, applied the same powerful instrument to plumbago, and obtained the following results :—' From a piece,' says he, ' of very fine plumbago, from Carolina, I sawed small parallelopipeds, about one-eighth of an inch in diameter and from three-fourths of an inch to one inch and a quarter in length: these were sharpened at one end, and one of them was employed to point one pole of the deflagrator, while the other was terminated by prepared charcoal. The best were obtained when the plumbago was connected with the copper, and prepared charcoal with the zinc pole. The spark was vivid, and globules of melted plumbago could be discerned, even in the midst of the ignition, forming and formed upon the edges of the focus of heat. In this region also there was a bright scintillation, evidently owing to combustion, which went on where air had free access, but was prevented by the vapor of carbon, which occupied the highly luminous region of the focus, between the poles, and of the direct route between them. Just on and beyond the confines of the ignited portion of the plumbago there was formed a belt of a reddish-brown color, a quarter of an inch or more in diameter, which appeared to be owing to the iron, remaining from the combustion of the carbon of that part of the piece, and which, being now oxidized to a maximum, assumed the usual color of the peroxide of that metal.

' In various trials, the globules were formed very abundantly on the edge of the focus, and, in several instances, were studded around so thickly as to resemble a string of beads, of which the largest were of the size of the smallest shot; others were merely visible to the naked eye, and others still were microscopic. No globule ever appeared on the point of the plumbago which had been in the focus of heat, but this point presented a hemispherical excavation, and the plumbago there had the appearance of black scoriæ or volcanic cinders. These were the general appearances at the copper pole occupied by the plumbago.

' On the zinc pole, occupied by the prepared charcoal, there were very peculiar results. This pole was, in every instance, elongated towards the copper pole, and the black matter accumulated there presented every appearance of fusion, not into globules, but into a fibrous and striated form, like the half-flowing slag found on the upper currents of lava. It was evidently transferred, in the state of vapor, from the plumbago of the other pole, and had been formed by the carbon taken from the hemispherical cavity. It was so different from the melted charcoal, described in my former communications, that its origin from the plumbago could admit of no reasonable doubt. I am now to state other appearances, which have excited in my mind a very deep interest. On the end of the prepared charcoal, and occupying frequently an area of a quarter of an inch or more in diameter, were found numerous globules of perfectly melted matter, entirely spherical in their form, having a high vitreous lustre, and a great degree of beauty. Some of them, and generally they were those most remote from the focus, were of a jet black, like the most perfect obsidian; others were

brown, yellow, and topaz colored; others still were grayish-white, like pearl-stones, with the translucence and lustre of porcelain: and others still limpid like flint-glass, or, in some cases, like hyalite or precious opal, but without the iridescence of the latter. Few of the globules upon the zinc pole were perfectly black, while very few of those on the copper pole were otherwise. In one instance, when I used some of the very pure English plumbago (believed to be from Borrowdale), white and transparent globules were formed on the copper side.

'I detached some of the globules, and, partly bedding them in a handle of wood, tried their hardness and firmness; they bore strong pressure without breaking, and easily scratched, not only flint-glass, but window-glass, and even the hard green variety, which forms the aquafortis bottles.'

While again repeating the experiments, professor Silliman obtained still finer results.

'The spheres of melted plumbago were in some instances so thickly arranged as to resemble shot lying side by side; in one case they completely covered the plumbago, in the part contiguous to the point on the zinc side, and were, without exception, white, like minute, delicate concretions of mammillary chalcedony. Among a great number there was not one of a dark color, except that, when detached by the knife, they exhibited slight shades of brown at the place where they were united with the general mass of plumbago. They appeared to me to be formed by the condensation of a white vapor, which, in all the experiments where an active power was employed, I had observed to be exhaled between the poles, and partly to pass from the copper to the zinc pole, and partly to rise vertically in an abundant fume like that of the oxide proceeding from the combustion of various metals. It seems possible that it is white volatilised carbon, giving origin, by its condensation, in a state of greater or less purity, to the gray, white, and perhaps to the limpid globules.

'I have already stated that the white fume mentioned above, appears when points of charcoal are used. I have found that this matter collects in considerable quantities a little out of the focus of heat around the zinc pole, and occasionally exhibits the appearance of a frit of white enamel, or looks a little like pumice stone: only it has the whiteness of porcelain, graduating, however, into light gray, and other shades, as it recedes from the intense heat. In a few instances I obtained upon the charcoal, when this substance terminated both poles, distinct, limpid spheres, and at other times they adhered to the frit like beads on a string. Had we not been encouraged by the remarkable facts already stated, it would appear very extravagant to ask whether this white frit and these limpid spheres could arise from carbon, volatilised in a white state even from charcoal itself, and condensed in a form analogous to the diamond. The rigorous and obvious experiments necessary to determine this question it is not now practicable for me to make; and I must, in the mean time, admit the possibility that alkaline and earthy impurities may have contributed to the result.'

In another experiment, professor Silliman melted a piece of plumbago into two or three large limpid globules, and nothing remained of the original appearance of the plumbago but a small number of black points. Dr. Clarke says that the fusion of plumbago with the gas blowpipe was attended with a vivid scintillation. The surface was covered with a number of minute globules; some of which exhibited a limpid and highly transparent glass, others a glass of a brown hue; the larger globules being jet black and opake.

PLUMBERY is in part a practical application of hydraulics; it also embraces the casting and laying of sheet-lead as a covering on buildings. To the plumber is confided the pump-work, as well as the making and forming reservoirs, large and small, for all the purposes of our domestic economy. To him, also, we are indebted for the water-closet, an apparatus of English invention, and unknown on the continent till the peace of Amiens allowed of its exportation.

The plumber chiefly works in lead. This metal is known in the arts, from its durability, malleability, and many other properties, which renders it of the very highest importance.

As obtained from the mines, it is almost always combined with sulphur, and hence it is called a sulphuret. The operation of roasting the ore, or smelting, as it is called, to obtain the pure metal, consists:—1. In picking up the mineral to separate the unctuous, rich, or pure ore, and the stony matrix, and other impurities. 2. In pounding the picked ore under the stampers. 3. In washing the pulverised ore to carry off the matrix by the water. 4. In roasting the mineral in a reverberatory furnace, taking care to stir it, to facilitate the evaporation of the sulphur. When the surface begins to become of the consistence of paste, it is covered with charcoal, the mixture is shaken, the fire increased, and the lead then flows down on all sides to the bottom of the basin of the furnace, from which it is drawn off into moulds or patterns, prepared to receive it. The moulds are made so as to take a charge of metal equal to 154 lbs.; these are called in commerce pigs, or pigs of lead, and are exported, and sold as such at the depôts, by the lead merchants.

The plumbers use lead in sheets, and of these they have two kinds; one of which they call cast, and the other milled lead. The cast lead is used for the purpose of covering the flat roofs of terraces or buildings, forming gutters, lining reservoirs, &c. In architecture it is technically divided into 5, 5½, 6, 6½, 7, 7½, 8, and 8½ lbs. cast-lead, by which is understood that, to every foot superficial of such cast-lead, it is to contain these several weights of metal in each respectively; so that an architect, when directing a plumber to cover or line a place with cast sheet-lead, tells the workman that 'it is to be done with 6 or 7 lb. lead;' meaning by it that he expects each foot superficial of the metal to be equal in weight to six, seven, or other number of pounds. The plumbers sometimes attempt deception in this arrangement, and particularly in work agreed for by contract, by putting down a lighter metal than the one they have engaged to

do. The writer of this article has often had occasion to interfere in such attempts, and has had the whole of such lead removed, not finding it adequate in weight per foot to that which was contracted for.

Every plumber, who conducts business to any extent, casts his sheet-lead at home; this he does from the pigs, or from old metal which he may have taken in exchange. The ductility of lead renders it easy to be run. They provide a copper, well fixed in masonry, and placed at one end of their casting-shop, and near to the mould or casting-table. The casting-table is generally in its form a parallelogram, varying in its size from six feet in width to eighteen or more feet in length. It is raised from the ground as high as to be about six or seven inches below the top of the copper which contains the metal, and stands on strongly framed legs, so as to be very steady and firm. The top of the table is lined by deal boarding laid very even and firm, and it has a rim projecting upwards, four or five inches, all round. At the end of the table, nearest to the copper in which is the heated lead, is adapted a box equal in length to the width of the table; at the bottom of this is a long horizontal slit, from which the heated metal is to issue when it is to be cast into sheets. This box moves upon rollers along the edges of the projecting rim of the table, and is set in motion by ropes and pulleys fixed to beams over the table. As soon as the metal is found to be adequately heated, every thing is made ready for casting it on the table, the bottom of which is then covered by a stratum of dry and clean sand, and a rake is applied to smooth it regularly all over the surface. When this is done the box is brought close up to the copper. It must be observed that these boxes are made, in their size, equal to the containing of as much of the melted lead as will cast the whole of the sheet at the same time, and the slit in the bottom is adjusted so as to let as much, and no more, out, during its progress along the table, as will be sufficient to cover it completely of the thickness and weight per foot required. When the box has dispersed its contents upon the table, it is suffered to cool and congeal, when it is rolled up and removed away, and other sheets are made till all the melted metal in the copper be cast. The sheets so formed are rolled up and weighed, as it is by weight the public are charged for sheet-lead.

The other kind of sheet-lead made use of by plumbers, called in the trade milled lead, is not manufactured at home. This they purchase of the lead merchant, as it is cast and prepared commonly at the ore and roasting furnaces. Such kind of lead is very thin, and commonly there is not more than four pounds of metal to the foot superficial. It is used by architects for the covering only of the hips and ridges of roofs of buildings. It is by no means adapted to gutters or terraces, or, in fact, to any part of a building much exposed either to great wear and tear, or the effects of the sun, as it expands and cracks by the latter, and is soon worn away by exposure. It is laminated in sheets about the same size as has been described for cast sheet-lead; and, in the operation of making, a laminating roller is used, or a flatting-mill, which reduces it to the state in which it is seen in commerce.

Solder is used by the plumber for the purpose of securing the joints of leaden work, in cases in which a lap or roll-joint cannot be employed. It is a general rule with respect to solder, that it should always be easier of fusion than the metal intended to be soldered by it. Next to this, care must be taken that the solder be as far as it is possible of the same color with the metal intended to be soldered. Technically, the soft solder is that which the plumber makes use of, by reason of its melting easily. This solder is composed of tin and lead, in equal parts, fused together; after which it is run into moulds in shape not unlike a common gridiron. In this state it is sold by the pound by the manufacturer. In the operation of soldering, the surfaces of the metal intended to be joined are scraped and rendered very clean, they are then brought close up to each other, and, to secure them, they are held by one plumber while another lays a little resin or borax about the joint. This is done to defend the metal, while soldering, from oxidation. The heated solder is then brought in a ladle and poured on the joint to be soldered, and is smoothed and finished by rubbing it about with a heated grozing-iron, and, when complete, it is filed or scraped off, and made even with the joint and contiguous surface of the lead.

The plumber has no need of great variety of working tools, as the ductility of the metal he works in does not require them, and what he may require are generally supplied by the master tradesman. They consist of an iron hammer made rather heavier than they usually are seen, having a short but thick handle. Two or three different sized wooden mallets, and a dressing and flatting-tool. This instrument is made of beechen wood, commonly about eighteen inches long, and two inches and a half square, planed quite smooth on one side, and rounded into an arch on the other, or upper side. One of its ends is tapered and rounded to make it convenient to be held in the hand of the workman. With this tool the plumber stretches out and flattens all the sheet-lead, as well as dresses it into the shape it may be wanted in the various purposes to which such lead is applied, using first the flat side of this tool, and then the round side, as may be required. They have also a jack and trying-plane, similar to the same kind of tools used by carpenters. These tools consist of a piece of beechen wood, that for the former about sixteen inches, and for the latter twenty-two inches long, in each of which a flat iron of sharpened steel is fitted, and held to its work by wooden wedges adapted to mortises made at the distance of about one-third from the fore-end of each plane. At the opposite end is formed a handle, by which the planes are worked. With such tools plumbers plane straight the edges of their sheet-lead, when it is required to present a very regular and correct line, as it is frequently wanted to do in architecture. They are provided also with a line and roller, called a chalk-line; with this they line out all the lead into the differ-

ent widths it may be wanted. Their cutting tools embrace chisels and gouges of different sizes, as well as several cutting-knives. These latter are used for the purpose of accurately cutting the sheet-lead into the strips and pieces to the division marked by the chalk-line which has been drawn on the lead. They have files of different sizes, which they use in manufacturing of cistern leads to pipes, pump-work, &c.

For soldering, they keep a variety of different sized grozing-irons; these are commonly about twelve inches long, and tapered at both ends, the handle-end turned quite round to allow of its being held firmly in the hand while in use. The opposite ends of which are made spherical, and some of them are of a spindle-shape, and of a size in proportion to the soldering to be done with them. These irons are heated to redness when used. Their iron ladles are of three or four sizes, and used for the purpose of heating the solder.

A plumber's measuring rule is of two feet in length, divided into three parts, each of which is eight inches long. Two of its legs are of box-wood, and duodecimally divided, and a third of a piece of slow-tempered steel; this is attached to one of the box legs by a pivot, on which it turns, and, the same legs being grooved out on its side, it receives the steel leg, when not in use, in this groove. The plumber finds a rule of this description very convenient, inasmuch as he can pass the steel leg of his rule into places he may have to examine, which he could not readily get any thing else to enter: it also answers the purpose occasionally of removing the oxide or any other matter from off his heated metal. A plumber's rule, by being so made, is constantly in use in one way or another.

Scales and weights are also very essential, as nothing done by the plumber is chargeable till it be weighed. He is also supplied with centre-bits of all sizes, and a stock to work them in, for the making perforations in lead or wood, where he may have occasion to insert pipes, &c., &c. The compasses he uses occasionally to strike out any circular portion of lead wanted to line or cover figures of that description.

Of laying sheet-lead.—The method usually adopted consists, if it be for terraces or flats, of covering such places with a bottom as even as possible, either by boarding or plastering; if by the former, observing to have the boards thick enough to prevent their warping and twisting upwards, as, when this is not attended to, the lead-work is soon cracked and becomes very unsightly. The sheets of lead not being more than about six feet in width makes it necessary to have joints when a large surface is to be covered; these joints the plumber manages in various ways to prevent their leaking. The best way is by forming what are called rolls: a roll consists of a piece of wood of about two inches square, planed rounding on its upper side; these are fastened under the joints of the lead between the edges of the two sheets which meet together, one of which is dressed up over the roll on the inside, and the other over both of them on the outside, by which means the water is prevented from percolating the flat. No other fastening is required than the adherence of the lead by being closely hammered together, and down upon the flat: indeed all fastening to the sheet lead, exposed to heat and cold, ought to be avoided, as it expands and shrinks by such vicissitudes, and if secured so as to prevent these from spontaneously affecting it, it will be cracked and dilapidated quickly. When rolls are not used, which is sometimes the case from their being found inconvenient by their projection, seams, as they are called, are employed, and consist in simply bending the two edges of the lead which approach to each other up and again over one another, and then dressing them down close to the flat throughout their whole length. This plan is by no means equal to the one by the roll, either for neatness or security. Soldering the joints is sometimes had recourse to for such kind of work, but it is a very bad way, and no good plumber would recommend it, as lead so fixed will be cracked and leak like a sieve, after having been exposed to one summer's sun. Leaden-flats, as well as gutters, require to be laid with a current to keep them dry. The rule for forming of which consists in giving a fall from back to front, or in the way in which it is determined that the sheets of lead are to be laid. A quarter of an inch to the foot run is a sufficient fall for lead, that is, if the sheets be twenty feet long, and hence they will require to be laid five inches higher at one end than at the other. This inclination, or, as it is called, giving a current, is generally apportioned and determined on by the carpenter and plumber previously to the laying of the lead, while the former's part of the business is doing.

Flashings, as they are called, are pieces commonly of milled-lead about eight or nine inches wide, and fixed all round the extreme edges of a flat or gutter, in which lead has been used. If a wall of brick-work surround it, it is passed into the joint between the bricks and its other edge, dressed over that of the edge of the lead in the flat or gutter, and, when no joint can be found to receive its upper edge; it is then fastened by wall-hooks, and its other edge dressed down as before.

Drips in flats or gutters consist in raising one part above another, and dressing the lead as has been described for covering the rolls. They are had recourse to when the lengths of the gutter or flat exceed that of the length of the sheet, or sometimes for convenience; they are also an expedient to avoid joining the lead by soldering it.

The pipes used by the plumber are of various sizes as well as descriptions. All the smaller sizes are called by their calibre or bore, thus, ½, ¾, 1, 1¼, 1½, and 2-inch pipe. They originally used to be cast by a core of wood of these respective diameters, but they are now all made by a machine worked by steam, which furnishes a neater article of almost any length, and considerably more cheap than heretofore. All those pipes, from ½ to 1½-inch calibre, are charged by the foot run, and those above that size by the hundred weight. The rain-water pipes attached to the outside of buildings, for the purpose of conveying off the superfluous water from the roofs of them, are called by the plumb-

ers socket-pipes; of these several respective diameters, 3, 3½, 4, or 5 inches, and are made from sheet-lead, and most commonly from that which is called milled. They are formed in lengths of from eight or ten feet each; the sheet-lead for making which is dressed on a rounded core of wood, and the vertical joint, which is made at the back, is fastened and secured by solder. The horizontal joints are formed by an astrigal moulding in a separate piece of lead about two or three inches wide, and which laps completely over it, both above and below it, and is called the lap-joint, or collar of the socket-pipe. Two broad pieces of lead are attached to the back of the lap-joints, called the tacks, these are spread out right and left of the pipe upon the wall, to which they are hammered quite close, and answer the purpose of fixing the whole to the buildings: to do which more effectually, wall-hooks of iron are sometimes put, and driven into the masonry. The cistern-head, which is fixed at the top of rain-water pipes, is made up of sheet-lead, or cast in a mould. They are commonly moulded into a variety of forms, these are easily supplied in a metal so ductile as lead is: they are fastened by tacks in the same way as the collars are.

Reservoirs are generally formed of wood or masonry on their exterior, and their insides lined with cast sheet-lead, the joints of which are secured by solder. In this application of soldering no fear of cracking need be anticipated, as change of temperature seldom takes place in or near the place where reservoirs are commonly placed.

Pumps are of various descriptions, and employed for purposes multiplied and extensive; but the plumber's employment in this kind of work is confined generally to the making of two or three kinds required in our domestic economy. These may be considered as the sucking, forcing, and lifting pumps. The former and latter being now the most commonly made use of.

The *sucking-pump* consists of two pipes, one of which is the barrel, and the other the suction-pipe, which is of smaller diameter; these are joined by means of flanches, pierced with holes to admit of being fastened by screwed bolts. The joint of the flanches is filled with leather, which, being strongly compressed by the screwed bolts, renders the joint air-tight. The lower end of the suction-pipe is commonly spread out a little to facilitate the entry of the water, and frequently has a grating across it to keep out filth or gravel. The working barrel is cylindrical, and as evenly bored as possible, that the piston may fill it with as little friction as may be consistent with air-tightness. The piston is a sort of truncated cone, generally made of wood, the small end of which is cut off at the sides, so as to form a sort of arch, and by which it is fastened to the iron rod or spindle. The two ends of the conical part may be hooped with brass: this cone has its larger end surrounded with a ring or band of strong leather, fastened to it by nails. The leather-band should always reach to some distance beyond the base of the cone, and the whole must be of uniform thickness all round, so as to suffer equal compression between the cone and working barrel when put into action. The seam or joint of the two ends of this band must be made very close, but not screwed or stitched together; if done so it would occasion lumps or inequalities, which would destroy its tightness; and no harm can result from the want of it, because the two ends will be squeezed close together when in the barrel. It is by no means necessary that this compression be great; when it is so, it is found a detrimental error of the pump-maker, by occasioning enormous friction, which destroys the very purpose they have in view, viz. rendering the piston air-tight; and it moreover causes the leather to wear through very soon at the edge of the cone, and also wears away the working barrel; in consequence of which it becomes wide in that part which is continually passed over by the piston, while the mouth remains of its original diameter, and hence follows the impossibility to thrust in a piston that shall completely fill the part so worn away.

The suction-pipe is usually made of smaller size than the working barrel, but only for the sake of economy, as it is not necessary that it should be so; but it ought to be of such a size that the pressure of the atmosphere may be able to fill the barrel with water as fast as the piston rises. This is the kind of pump fixed and made by plumbers, and is that which is commonly seen over wells and reservoirs for the purpose of raising water for the common purposes of life. The length of the suction-pipe should never be greater than thirty feet below its moveable valve, and there may be a loss of time in the ascent of the water, unless it be made even a few feet shorter. In using it the velocity of the stroke should never be less than four inches, nor greater than two or three feet in a second. The stroke should be as long as possible to prevent loss of water by the frequent alternations of the valves. When this pipe is adapted to common purposes, its diameter should be about two-thirds or three-fourths of that of the barrel

The *forcing-pump* consists of a working barrel, a suction-pipe, and a main, called the serving main, or raising pipe. This kind of pump was formerly much in use for the purpose of forcing water to unnatural heights. The raising pipe of such pumps is usually in three parts, the first of which may be considered as making part of the working barrel of the pump, and is sometimes cast in one piece, whilst the second is joined to it by flanches, with which it forms an elbow. The third is properly the beginning of the main, and is continued forward to the place of the delivery of the water, where it is supplied by two moveable valves. The beauty of this kind of pump consists in the perfection of the barrel and piston, for which reason it is now made of brass or bell metal; and, when it is well polished, the piston may be used in it without either a wadding or leather.

The *lifting-pump* consists, as before, of a working barrel, which is closed at both ends. The piston is solid, and its rod passes through a collar of leather in the plate, and closes the upper end of the working barrel. The barrel communicates laterally with the suction-pipe, and

above with the raising main. This kind of pump differs only from the sucking-pump before described in having two valves, the lower one moveable, and the upper one fixed. The first pump, invented above a century before Christ by Ctesibius of Alexandria, to whom also music is indebted for the organ, was a forcing-pump, as may be easily collected from its description by Vitruvius (l. x. cap. 12).

Mixed pumps are the combination of the principle of the forcing and sucking-pumps into one machine; when the lower valve of a forcing-pump is above the surface of the water it can only raise it by suction, but the manufacture of the pump remains as before. The mechanism of a pump may be employed for converting the weight of water descending in its barrel to the purpose of working another pump; such a pump has been invented by Mr. Trevithick, a description of which may be seen in Nicholson's Journal.

Of the spiral pump.—If we wind a pipe round a cylinder of which the axis is horizontal, and connect one end with a vertical tube, while the other is at liberty to turn round and receive water and air in each revolution, the machine is called a spiral pump. This pump was invented about 1746, by Andrew Wirtz, a pewterer in Zurich, and was afterwards employed at Florence. At Archangelsky near Moscow such a pump, it is reported, was erected in 1784, which raised a hogshead of water in a minute to a height of seventy-four feet, and through a pipe 760 feet in length. The force employed is not stated; we may therefore conjecture that it was turned by water. See PUMP, AND HYDRAULICS.

Water-closets are manufactured by one set of workmen, and sold to the plumber to fix in their places. A water-closet consists of a basin and apparatus, traps, socket-pipe, and cistern; the whole of which is put into action by the plumber. To supply the cisterns with water is the purpose of his adopting a forcing or lifting-pump. These latter are on a small scale, very neatly fitted up, and require only the suction and main pipe to be added by the plumber to be capable of forcing or lifting water to almost any height. They are sold by the manufacturers at various prices. The mains or pipes are charged by the plumber additional, with such day-work as is required in putting the whole in its place. Plumbers charge their sheet-lead by the 1 cwt., and their prices are arranged half-yearly by the Warden and Court of Assistants of the Plumbers' Company. The milled lead is charged two shillings per cwt. more than the cast.

PLUME, *n. s.* & *v. a.*
PLU'MAGE, *n. s.*
PLU'MOUS, *adj.*
PLU'MY.
} Fr. *plume*, *plumage*; Lat. *pluma*. A feather; collection of feathers, as in a crest; hence a crest; token of honor; pride; also a term used by botanists for that part of the seed of a plant which in its growth becomes the trunk: to pick and adjust feathers; place as a plume; or adorn with plumes: also (Fr. *plumer*) to strip of plumes or feathers; to make bare or defenceless: plumage is a collection or suit of feathers: plumous and plumy mean feathery or resembling feathers.

Let frantick Talbot triumph for a while,
And, like a peacock, sweep along his tail;
We'll pull his *plumes*, and take away his train
Shakspeare.

Let every feeble rumour shake your hearts,
Your enemies with nodding of their *plumes*
Fan you into despair. *Id. Coriolanus.*

Great duke of Lancaster, I come to thee
From *plume*-pluckt Richard, who with willing soul
Adopts thee heir. *Id. Richard II.*

Farewel the *plumed* troops, and the big war,
That make ambition virtue. *Id. Othello.*

They stuck not to say, that the king cared not to *plume* the nobility and people to feather himself.
Bacon.

The *plumage* of birds exceeds the pilosity of beasts. *Id.*

With this againe, he rusht upon his guest,
And caught him by the horse-haire *plume*, that dangled on his crest. *Chapman.*

Ambitious to win from me some *plume*.
Milton.

His statue reached the sky, and on his crest
Sat horror *plumed*. *Id. Paradise Lost.*

Satan fell, and straight a fiery globe
Of angels on full sail of wing flew nigh,
Who on their *plumy* vans received him soft
From his uneasy station, and upbore
As on a floating couch through the blithe air.
Milton.

Eastern travellers know that ostridges' feathers are common, and the ordinary *plume* of Janizaries.
Browne.

The fearful infant,
Daunted to see a face with steel o'erspread,
And his high *plume* that nodded o'er his head.
Dryden.

Such animals as feed upon flesh devour some part of the feathers of the birds they gorge themselves with, because they will not take the pains fully to *plume* them. *Ray.*

Swans must be kept in some enclosed pond, where they may have room to come ashore and *plume* themselves. *Mortimer.*

They appear made up of little bladders, like those in the *plume* or stalk of a quill. *Grew's Museum.*

Sometimes they are like a quill, with the *plumy* part only upon one side. *Id. Cosmology.*

Appeared his *plumy* crest, besmeared with blood.
Addison.

This has a like *plumous* body in the middle, but finer. *Woodward.*

Say, will the falcon, stooping from above,
Smit with her varying *plumage*, spare the dove?
Pope.

But gaudy *plumage*, sprightly strain,
And form genteel, were all in vain,
And of a transient date. *Cowper.*

PLUMEAL'LUM, *n. s.* Lat. *alumen plumosum.* A kind of asbestus.

Plumeallum, formed into the likeness of a wick, will administer to the flame, and yet not consume.
Wilkins.

PLUMERIA, in botany, red jasmine, a genus of the monogynia order, and pentandria class of plants; natural order thirtieth, contortæ.

PLUMIER (Charles), a learned Minim born at Marseilles, and one of the most able botanists of the seventeenth century. He was instructed by the famous Maignan, who taught him mathematics, the art of making burning-glasses, microscopes, &c. He at length went to Rome, and applied himself entirely to botany under a

skilful Italian. On his return to Provence, he settled in the convent at Bornes, a maritime place near Hieres, where he made discoveries in the fields with respect to simples. He was sent by the French king to America, to bring from thence such plants as might be of service in medicine. He made three different voyages to the Antilles, and to the island of St. Domingo. The king gave him a pension; and he at last settled at Paris. Preparing to go a fourth time to America, he died at the port of Santa Maria, near Cadiz, in 1706. He wrote several excellent works: the chief are, 1. A volume of the Plants in the American Islands. 2. A Treatise on the American Fern. 3. The Art of Turnery; a curious work embellished with plates.

PLUM'MET, *n. s.* Diminutive of PLUMB, which see. A weight of lead hung at a string, by which depths are sounded, and perpendicularity ascertained.

Judgment also will I lay to the line, and righteousness to the *plummet*. *Isaiah* xxviii. 17.

Deeper than did ever *plummet* sound,
I'll drown my book. *Shakspeare. Tempest.*

God sees the body of flesh which you bear about you, and the *plummets* which it hangs upon your soul; and therefore, when you cannot rise high enough to him, he comes down to you. *Duppa.*

The heaviness of these bodies, being always in he ascending side of the wheel, must be counterpoised by a *plummet* fastened about the pulley on the axis: this *plummet* will descend according as the sand doth make the several parts of the wheel lighter or heavier. *Wilkins.*

Fly, envious time,
Call on the lazy leaden-stepping hours,
Whose speed is but the heavy *plummet's* pace.
Milton.

PLUMMET, PLUMB RULE, or PLUMB LINE, an instrument used by carpenters, masons, &c., in order to judge whether walls, &c., be upright planes, horizontal, or the like. It is thus called from a piece of lead, fastened to the end of a cord, which usually constitutes this instrument. Sometimes the string descends along a wooden ruler, &c., raised perpendicularly on another; in which case it becomes a level.

PLUMMING, among miners, is the method of using a mine-dial, in order to know the exact place of the work where to sink down an air-shaft, or to bring an adit to the work, or to know which way the load inclines when any flexure happens in it. It is thus performed:—A skilful person with an assistant, and with pen, ink, and paper, and a long line, and a sun-dial, after his guess of the place above ground, descends into the adit or work, and there fastens one end of the line to some fixed thing in it; then, the incited needle is let to rest, and the exact point where it rests is marked with a pen: he then goes on farther in the line still fastened, and at the next flexure of the adit he makes a mark on the line by a knot or otherwise: and then letting down the dial again, he there likewise notes down that point at which the needle stands in this second position. In this manner he proceeds, from turning to turning, marking down the points, and marking the line, till he comes to the intended place: this done, he ascends and begins to work on the surface of the earth what he did in the adit, bringing the first knot in the line to such a place where the mark of the place of the needle will again answer its pointing, and continues this till he come to the desired place above ground, which will of course be perpendicular over that part of the mine into which the air shaft is to be sunk.

PLUMP, *n.s.*, *adj.*, & *v. a.*
PLUMP'NESS, *n. s.*
PLUMP'Y, *adj.*
Dr. Johnson says of this word the etymology is not known. Skinner derives it from *pommele*, French, full like a ripe apple; it might be more easily deduced from plum, which yet seems very harsh. Junius omits it. But there is a Belg. *plomb*, and Swed. *plumbe*, meaning a tuft, or cluster. Somewhat fat; sleek; full and smooth; not lean; a cluster; knob; tuft: to swell; fatten: plumpness is, fatness; fulness of habit or appearance: plumpy, a ludicrous word for fat.

We rested under a *plump* of trees. *Sandys.*

Come, thou monarch of the vine,
Plumpy Bacchus, with pink eyne,
In thy vats our cares be drowned.
Shakspeare.

England, Scotland, Ireland, lie all in a *plump* together, not accessible but by sea. *Bacon.*

Warwick, having espied certain *plumps* of Scottish horsemen ranging the field, returned towards the arriere to prevent danger. *Hayward.*

The particles of air expanding themselves, *plump* out the sides of the bladder, and keep them turgid.
Boyle.

Spread upon a lake, with upward eye
A *plump* of fowl behold their foe on high;
They close their trembling troop, and all attend
On whom the sowsing eagle will descend.
Dryden.

The heifer that valued itself upon a smooth coat and a *plump* habit of body, was taken up for a sacrifice; but the ox, that was despised for his raw bones, went on with his work still. *L'Estrange.*

I'm as lean as carrion; but a wedding at our house will *plump* me up with good cheer. *Id.*

Let them lie for the dew and rain to *plump* them.
Mortimer.

Plump gentleman,
Get out as fast as e'er you can:
Or cease to push, or to exclaim,
You make the very crowd you blame. *Prior.*

Those convex glasses supply the defect of *plumpness* in the eye, and by encreasing the refraction make the rays converge sooner, so as to convene at the bottom of the eye. *Newton's Opticks.*

The famished crow
Grows *plump* and round, and full of mettle.
Swift.

She dexterously her *plumpers* draws,
That serve to fill her hollow jaws.
Id. Miscellanies.

PLUMP, *adv.* Corrupted from PLUMB, which see. With a sudden fall.

I would fain now see 'em row'ld
Down a hill, or from a bridge
Head-long cast, to break their ridge;
Or to some river take 'em
Plump, and see if that would wake 'em.
Ben Jonson.

PLUN'DER, *v. a.* & *n. s.*
PLUN'DERER.
Belg. and Teut. *plunderer*; Dan. *plyndre.* To pillage; rob: plunder is the spoil or pillage of war; a robbery: plunderer, a thief; robber.

Let loose the murmuring army on their masters,
To pay themselves with *plunder*. *Otway.*

Being driven away, and his books *plundered*, one of his neighbours bought them in his behalf, and preserved them for him till the end of the war. *Fell.*

Ships the fruits of their exaction brought,
Which made in peace a treasure richer far,
Than what is *plundered* in the rage of war. *Dryden.*

We cannot future violence o'ercome,
Nor give the miserable province ease,
Since what one *plunderer* left the next will seize. *Id.*

Nebuchadnezzar *plunders* the temple of God, and we find the fatal doom that afterwards befel him. *South's Sermons.*

It was a famous saying of William Rufus, whosoever spares perjured men, robbers, *plunderers*, and traitors, deprives all good men of their peace and quietness. *Addison.*

Their country's wealth our mightier misers drain,
Or cross, to *plunder* provinces, the main. *Pope.*

He *plundered* the convents of their stores of pro- . . and told them that he never had heard of any magazines erected by the Apostles. *Johnson.*

PLUNGE, *v. a.*, *v. n.*, & *n. s.* Fr. *plonger*; Belg. *plompen*; Germ. *plump*. To force suddenly into or under water; hence to force or urge into distress, guilt, or hazard; sink suddenly; to dive; fall or rush into crime, calamity, or hazard: the act of putting or sinking under water; difficulty; strait; distress.

She was weary of life, since she was brought to that *plunge*, to conceal her husband's murder, or accuse her son. *Sidney.*

Accoutred as I was I *plunged* in. *Shakspeare.*

Plunge us in the flames. *Milton.*

O conscience! into what abyss of fears
And horrors hast thou driven me, out of which
I find no way; from deep to deeper *plunged*. *Id.*

He could find no other way to conceal his adultery, but to *plunge* into the guilt of a murther. *Tillotson.*

Headlong from hence to *plunge* herself she springs,
But shoots along supported on her wings. *Dryden.*

I mean to *plunge* the boy in pleasing sleep,
And ravished in Idalian bowers to keep. *Id.*

At this advanced, and sudden as the word,
In proud Plexippus' bosom *plunged* the sword. *Id.*

His courser *plunged*,
And threw him oft; the waves whelmed over him,
And helpless in his heavy arms he drowned. *Id.*

People, when put to a *plunge*, cry out to heaven for help, without helping themselves. *L'Estrange.*

When tortoises have been a long time upon the water, their shell being dried in the sun, they are easily taken; by reason they cannot *plunge* into the water nimbly enough. *Ray.*

You warn us of approaching death, and why
Will you not teach us what it is to die?
But having shot the gulf, you love to view
Succeeding spirits *plunged* along like you;
Nor lend a friendly hand to guide them through. *Norris.*

Bid me for honour *plunge* into a war;
Then shalt thou see that Marcus is not slow. *Addison.*

Wilt thou behold me sinking in my woes?
And wilt thou not reach out a friendly arm,
To raise me from amidst this *plunge* of sorrows? *Id.*

Impotent of mind and uncontrouled,
He *plunged* into the gulf which heaven foretold. *Pope.*

Without a prudent determination in matters before us, we shall be *plunged* into perpetual errors. *Watts.*

Let them not be too hasty to *plunge* their enquiries at once into the depth of knowledge. *Id.*

He must be a good man; a quality which Cicero and Quinctilian are much at a *plunge* in asserting to the Greek and Roman orators. *Baker on Learning.*

Thence country wives, wi' toil and pain,
May *plunge* and *plunge* the kirn in vain;
For oh! the yellow treasures taen,
By witching skill;
An' dawtit, twal-pint flawkie's gaen
As yell's the Bill. *Burns.*

Half on wing,
And half on foot, they brush the fleecy flood,
Conscious, and fearful of too deep a *plunge*. *Cowper.*

Then must I *plunge* again into the crowd,
And follow all that peace disdains to seek? *Byron.*

PLUNKET (Oliver), D. D., a Roman Catholic divine, the titular archbishop of Armagh, went to Rome at an early age, and received the title of primate of Ireland from pope Innocent XI. In September, 1679, he was arrested on a charge of treason, and being sent to London, was executed at Tyburn in 1681. The life of this respectable man, whose innocence was subsequently established, fell a sacrifice to a conspiracy between some priests of a scandalous life, whose disorders he had censured, and certain persons under sentence of death.

PLU'RAL, *adj.*
PLU'RALIST, *n. s.*
PLURAL'ITY,
PLU'RALLY.
Lat. *pluralis*. More than one: a pluralist is he who holds more than one ecclesiastical benefice: plurality, the state of being more than one; the greater number or majority: plurally, in a sense implying more than one.

To be brief, he (a pedant) is a heteroclite, for he wants the *plural* number, having only the single quality of words. *Sir E. Overbury.*

Thou hast no faith left now, unless thou'd'st two;
Better have none
Than *plural* faith, which is too much by one. *Shakspeare.*

It is not *plurality* of parts, without majority of parts, that maketh the total greater; yet it seemeth to the eye a shorter distance of way, if it be all dead and continued, than if it have trees, whereby the eye may divide it. *Bacon.*

Those hereticks had introduced a *plurality* of gods, and so made the profession of the unity part of the symbolum that should discriminate the orthodox from them. *Hammond.*

The Greek and Hebrew have two variations, one to signify the number two, and another to signify a number of more than two; under one variation the noun is said to be of the dual number, and under the other of the *plural*. *Clarke.*

'Tis impossible to conceive how any language can want this variation of the noun, where the nature of its signification is such as to admit of *plurality*. *Id. Latin Grammar.*

Sometimes it admitteth of distinction and *plurality*; sometimes it reduceth all into conjunction and unity. *Pearson.*

Take the *plurality* of the world, and they are neither wise nor good. *L'Estrange.*

If the *pluralists* would do their best to suppress

curates, their number might be so retrenched, that they would not be in the least formidable.

Collier on Pride.

They could forego *plurality* of wives, though that be the main impediment to the conversion of the East Indies. *Bentley.*

PLURAL. See GRAMMAR.

PLURALITY OF BENEFICES, or livings, is where the same clerk is possessed of two or more spiritual preferments, with cure of souls. The smallness of some benefices first gave rise to pluralities; for an ecclesiastic, unable to subsist on a single one, was allowed to hold two; and at length the number increased without bounds. A remedy was attempted for this abuse at the council of Lateran under Alexander III. and Innocent III. in 1215, when the holding more than one benefice was forbidden by a canon under the penalty of deprivation; but, the same canon granting the pope a power to dispense with it in favor of persons of distinguished merit, the prohibition became almost useless. They were also restrained by stat. 21 Hen. VIII. cap. 13, which enacts that if any person having one benefice with cure of souls, of the yearly value of £8 or above (in the king's books), accept any other with cure of souls, the first shall be adjudged in law to be void, &c., though the same statute provides for dispensation in certain cases. In England, to procure a dispensation, the presentee must obtain of the bishop in whose diocese the livings are, two certificates of the values in the king's books, and the reputed values and distance; one for the archbishop, and the other for the lord chancellor. And, if the livings lie in two dioceses, then two certificates of the same kind are to be obtained from each bishop. He must also show the archbishop his presentation to the second living; and bring with him two testimonials from the neighbouring clergy concerning his behaviour and conversation, one for the archbishop, and the other for the lord chancellor; and he must also show the archbishop his letters of orders, and a certificate of his having taken the degree of M. A. at the least, in one of the universities of this realm, under the hand of the register. And if he be not B. D. nor D. D. nor LL. B. nor LL. D. he is to procure a qualification of a chaplain, which is to be duly registered in the faculty of office, in order to be tendered to the archbishop, according to the statute. And if he has taken any of the aforesaid degrees, which the statute allows as qualifications, he is to procure a certificate thereof, and to show the same to the archbishop; after which his dispensation is made out at the faculty office, where he gives security according to the direction of the canon. He must then repair to the lord chancellor for confirmation under the broad seal; and he must apply to the bishop of the diocese where the living lies for his admission and institution. By the several stamp acts, for every skin or paper, or parchment, &c., on which any dispensation to hold two ecclesiastical dignities or benefices, or a dignity and a benefice, shall be engrossed or written, there shall be paid a treble 40*s.* stamp duty. There is also a regulation with regard to pluralities; but it is often dispensed with: for, by the faculty of dispensation, a pluralist is required, in that benefice from which he shall happen to be most absent, to preach thirteen sermons every year, and to exercise hospitality for two months yearly. In Germany the pope grants dispensations for possessing a plurality of benefices, on pretence that the ecclesiastical princes there need large revenues to bear up against the Protestant princes.

PLUS, Lat. more, in algebra, a character marked thus +, used for the sign of addition. See ALGEBRA.

PLUSH, *n. s.* Fr. *peluche;* Dan. *plys;* Lat. *pilosus.* A kind of shaggy cloth or shag; a kind of woollen velvet.

The bottom of it was set against a lining of *plush*, and the sound was quite dead, and but mere breath. *Bacon.*

I love to wear clothes that are flush,
Not prefacing old rags with *plush*. *Cleaveland.*

The color of *plush* or velvet will appear varied if you stroak part of it one way, and part of it another. *Boyle.*

PLUSH, a kind of stuff, with a sort of velvet nap or shag on one side, consisting of a woof of a single woollen thread, and a double warp; the one of two woollen threads twisted, the other goat's or camel's hair; though there are plushes entirely of worsted, others of hair, and others again of silk, cotton, &c. White plush breeches have been often worn by English dragoons. They resist moisture, and are easily cleaned. Blue plush pantaloons are worn by the Royal Artillery drivers.

PLUSH'ER, *n. s.* Lat. *galea lævis.* A sea fish.

The pilchard is devoured by a bigger kind of fish called a *plusher*, somewhat like the dog-fish, who leapeth above water, and therethrough bewrayeth them to the balker. *Carew.*

PLUTARCH, a celebrated philosopher and historian of antiquity, who lived from the reign of Claudius to that of Hadrian, was born at Chæronea, a small city of Bœotia in Greece. Plutarch's family was ancient in Chæronea: his grandfather Lamprias was a philosopher, and eminent for his learning; and is often mentioned by Plutarch in his writings, as is also his father. Plutarch was placed, at an early age, under the care of Ammonius, an Egyptian; who, after having taught philosophy with great reputation at Alexandria, settled at Athens. Under this master he made great advances in knowledge; but neglected the study of languages. Through he is supposed to have resided in Rome nearly forty years, at different times, yet he never seems to have acquired a competent skill in the Latin language; nor did he even cultivate his mother tongue, the Greek, with acccuracy, and hence that harshness, inequality, and obscurity in his style, which is so justly complained of. After leaving Ammonius, he travelled into Egypt, and was initiated in the Egyptian mysteries, as appears by his treatise of Isis and Osiris: in which he shows himself well versed in their ancient theology and philosophy. From Egypt he returned into Greece; and, visiting in his way all the academies and schools of the philosophers, gathered from them many of those observations with which he has enriched his works. He does not

seem to have been attached to any particular sect, but culled from each whatever he thought excellent. He disliked the paradoxes of the Stoics, but was still more averse from the impiety of the Epicureans: in many things he followed Aristotle; but his favorites were Socrates and Plato, whose memory he revered so highly that he annually celebrated their birth-days with much solemnity. He applied himself with extreme diligence to collect, not only all books, but also all the sayings and observations of wise men, which he had heard in conversation, or had received from others by tradition; and likewise to consult the records and public instruments preserved in cities which he had visited in his travels. He took a journey to Sparta in order to search the archives of that famous kingdom, to understand their ancient government, with the history of their legislators, kings, and ephori. Few circumstances of Plutarch's life are known. According to the learned Fabricius, he was born under Claudius, fifty years after the Christian era. He was married to a most amiable woman of his own native town, whose name was Timoxena. He had several children, and among them two sons; one called Plutarch after himself, the other Lamprias in memory of his grandfather. Lamprias seems to have inherited his father's philosophy; and to him we owe the table or catalogue of Plutarch's writings, and perhaps also his apophthegms. He had a nephew, Sextus Chæroneus, who taught the emperor Marcus Aurelius the Greek tongue, and was much honored by him. Some think that the critic Longinus was of his family; and Apuleius, in the first book of his Metamorphoses, affirms himself to be descended from him. Plutarch was several times in Rome, and contracted an intimacy with Sossius Senecio, who had been four times consul, and to whom Plutarch has dedicated many of his lives. But his chief object in these journeys was to search the records of the capitol, and the public libraries. Suidas says he was entrusted also with the management of public affairs in the empire, during his residence in the metropolis. 'Plutarch,' says he, 'lived in the time of Trajan, who bestowed on him the consular ornaments, and caused an edict to be passed that the magistrates or officers of Illyria should do nothing in that province without his knowledge and approbation.' It is generally supposed that Trajan, a private man when Plutarch first came to Rome, was, among other nobility, one of his auditors; and that, therefore, this emperor afterwards made use of him in his councils. Fabricius asserts that he was Trajan's preceptor, and that he was raised to the consular dignity by him, and made procurator of Greece in his old age by Adrian. The desire of visiting his native country prevailed with him at length to leave Italy; and at his return he was unanimously chosen archon of Chæronea, and soon after admitted into the number of the Delphic Apollo's priests. Fabricius says he died in the fifth year of Adrian, aged seventy. His works have been divided into Lives and Morals.

PLUTEOUS, a defensive machine, much used by the ancient Romans. It was composed of wicker hurdles laid like a roof on the top of posts, which the soldiers, who went under it for shelter, bore up with their hands. Kennet, in page 238 of his Roman Antiquities, observes that some will have them, as well as the vineæ, to have been contrived with a double roof; the first and lower roof of planks, and the upper roof of hurdles, to break the force of any blow, without disordering the machine. They were put much to the same use as the musculi. Father Daniel, the jesuit, in his history of the French militia, quotes a passage out of a poem by Abbon the Monk, entitled the Siege of Paris; the meaning of which is that the Normans brought up a large quantity of machines, that were called plutei by the Romans, and that they thus preserved their soldiers from the arrows and javelins.

PLUTO, in Pagan worship, the king of the infernal regions, was the son of Saturn and Ops, and the brother of Jupiter and Neptune. This deity, being childless and unmarried, mounted his chariot to visit the world; and, arriving in Sicily, became enamoured of Proserpine, whom he saw gathering flowers with her companions in the valley of Enna, near mount Ætna; when, forcing her into his chariot, he drove her to the river Chemarus, through which he opened himself a passage back to the realms of night. See Ceres and Proserpine. Pluto is usually represented in an ebony chariot drawn by four black horses; sometimes holding a sceptre, to denote his power; at others a ward, with which he drives away the ghosts; and at others keys, to signify that he had the keys of death. Homer observes that his helmet had the quality of rendering the wearer invisible, and that Minerva borrowed it in order to be concealed from Mars when she fought against the Trojans. Pluto was greatly revered both by the Greeks and Romans, who erected temples and altars to him. To this god sacrifices were offered in the night, and it was not lawful to offer them by day. In a piece of painting discovered about the end of the last century, in an old burial place of the Nassonian family, Pluto and Proserpine are sitting on thrones, whilst Mercury is introducing the ghost of a young woman, who seems intimidated at Pluto's stern look. Behind stands her mother, waiting to conduct her back to some grove in Elysium. Pluto holds a sceptre in his hand, and has a veil over his head.

PLUTUS, in Pagan worship, the god of riches. He was represented as appearing lame when he approached, and with wings at his departure; to show the difficulty of amassing wealth, and the uncertainty of its enjoyment. He was also frequently represented blind, to show that he often bestowed his favors on the most unworthy, and left in necessity those who had the greatest merit.

PLUVIAL, *adj.* } Lat. *pluvia*. Rainy; relating to rain.
PLUVIOUS. }

The fungous parcels about the wicks of candles only signifieth a moist and *pluvious* air about them.

Browne.

PLUVIUS, a surname of Jupiter. He was invoked by that name among the Romans whenever the earth was parched up by continued heat, and want of rain. He had an altar in the temple on the capitol.

PLUVIOMETER or rain gauge, is an instrument used for showing the quantity of rain that falls upon the earth at any particular place, when it is desirable such observations should be made. It consists of a funnel communicating with a cylindrical tube at its bottom, into which the rain is conveyed by the funnel. The depth of water in the cylinder is measured by a rule fixed to a float, the rule passing through the centre of the funnel. The divisions on the rule show the number of cubic inches of water that have fallen on a surface equal to the area of the top of the funnel. The funnel is so contrived as to prevent the water from evaporating. To use the pluviometer, so much water must be first put into the cylinder as will receive the float, so that O on the rule may exactly coincide with the aperture of the funnel. The instrument itself should be firmly fixed, so that whatever winds may blow the fall of the rain may not be interrupted by any obstacles. By the pluviometer the mean *annual* depths of rain in inches may be ascertained.

PLY, *v. a.* & *v. n.* Belg. *plien*, to work at any thing. Junius and Skinner. To work closely and importunately: set on work; practise or solicit diligently: as a verb neuter, to work, to offer service; go or busy one's self in haste.

Their bloody task, unwearied still they *ply*.
Waller.

Keep house, and *ply* his book, welcome his friends,
Visit his countrymen, and banquet them.
Shakspeare.

Still at his oar the industrious Libys *plies*;
But as he *plies*, each busy arm shrinks in,
And by degrees is fashioned to a fin. *Id. Ovid.*

He who exerts all the faculties of his soul, and *plies* all means and opportunities in the search of truth, may rest upon the judgment of his conscience so informed, as a warrantable guide. *South.*

Whosoever has any thing of David's piety will be perpetually *plying* the throne of grace with such like acknowledgments; as, blessed be that providence which delivered me from such a lewd company. *Id.*

It is not his (by manlier virtues graced)
To pore upon the noon-tide brook, and sigh,
And weep for age o'er sorrow uneffaced,
Him social duties call the tear to dry,
And wake the nobler powers of usefulness to *ply*.
Kirke White.

Ply, *v. n.* & *n. s.* Fr. *plier*. To bend: bent; turn; bias; plait; fold.

The late learners cannot so well take the *ply* except it be in some minds that have not suffered themselves to fix, but have kept themselves open, and prepared to receive continual amendment.
Bacon.

The willow *plied*, and gave way to the gust, and still recovered itself again, but the oak was stubborn, and chose rather to break than bend.
L'Estrange.

The rugæ or *plies* of the inward coat of the stomach detain the aliment in the stomach.
Arbuthnot.

Plyers, in fortification, a kind of balance used in raising or letting down a draw-bridge. They consist of two timber levers, twice as long as the bridge they lift, joined together by other timbers formed together in the form of a St. Andrew's cross to counterpoise them. They are supported by two upright jambs, on which they swing; and the bridge is raised or let down by means of chains joining the ends of the plyers and bridge.

Plying, in the sea-language, the act of making, or endeavouring to make, a progress against the direction of the wind. Hence a ship that advances well in her course in this manner of sailing, is said to be a good plyer.

PLYMOUTH, a sea-port town, near the extreme western point of the Devonshire coast, is a place of considerable antiquity, and was principally inhabited by fishermen till the reign of Henry II., since which time it has gradually increased in importance. Its distance from London is 218 miles. Many of the streets are narrow and irregular, but great improvements are daily taking place; and elegant edifices both public and private springing up in every direction. The town contains two parish churches, St. Andrew and Charles, and eleven Dissenting places of worship. The public charities and religious societies are numerous. Its literary institutions are the Athenæum, which owes its origin to the efforts of Henry Woollcombe, esq., and a few other public-spirited gentleman; and the public library, which contains several thousand valuable books. The inns are numerous and commodious. The theatre and royal hotel form one magnificent building 275 feet in length, with noble porticoes, &c., being erected on the model of a Greek temple on the Ilyssus. Plymouth is supplied with water by a fine stream which was brought from Dartmoor, in the reign of Elizabeth, through the exertions of Sir Francis Drake, the celebrated circumnavigator. The market-place is remarkably large, and abundantly supplied with the necessaries of life at a cheap rate. The corporation consists of a mayor, twelve aldermen, twenty-four common councilmen, recorder, and town clerk. Plymouth carries on a considerable coasting trade, and it has some foreign commerce, but its manufactures of coarse woollens, serges, &c., which were formerly very extensive, have totally disappeared. Its sound affords fine anchorage for ships, particularly since the erection of its magnificent breakwater.

This noble mole stretches across the entrance of the sound, and is 1700 yards long. It was begun in 1812, and is formed of immense blocks of marble heaped one upon another; and which, having been shaken together by the storms of succeeding winters, have acquired amazing strength and solidity. From the breakwater may be seen, in fine weather, the Eddystone lighthouse. See Eddystone Rocks. Inside the Breakwater, and about a mile from the main land, is St. Nicholas's Island, comprising an area of seven acres, and strongly fortified.

The celebrated M. Dupin saw this great work in progress, in September 1816, and his accurate description of the mode in which the operations were carried on both at the works and on shore cannot fail to be interesting to our readers.

'The hills of stone, lining the right bank of the mouth of the Plym (the Catwater), have been cut, and, by the aid of gunpowder, masses are detached weighing ten or twelve tons. These masses are thrown into the sea, without any par-

ticular order, but within the lines fixed for the boundaries of the work. The points for depositing the stone, so as to diminish the width, and thereby form the internal and external slopes, are determined by means of sounding. When the work at any part rises high enough to be visible at low water, the largest blocks of stone are employed. They are laid together in such a way as to produce the greatest possible resistance to any derangement which might be occasioned by the waves of the sea. They are not, however, so combined as to form a smooth surface externally; on the contrary, they present great irregularities, and thus form a break-water, in the true sense of the word. The external plane or slope, from the level of low water to the summit, as well as the horizontal part of the summit, have a smooth and uniform surface: but the stones, though smoothed on the external surface, are not squared on the other sides. They are laid one into another; and in form, bulk, and mode of connexion, perfectly represent those ancient structures, celebrated for solidity, and known by the name of Cyclopean Structures.

'We may now describe the means employed in extracting the stone from the quarries, placing it on board vessels, and disembarking it at the necessary point. These methods are, generally speaking, as simple as ingenious, and are well worthy the attention of the mechanician. The hills, from which the stone is extracted, extend to the bank of the Plym; and a quay is constructed on the bank of the river, to afford conveniences for the loading of several vessels at the same time. The hills are every where covered with strata of vegetable earth, more or less thick. This earth is gradually removed before the stone can be got out. The hills are cut from the top downwards, by sections nearly vertical. The vegetable earth which has been removed, together with the small pieces of stone procured in course of the excavation, are piled up, and form an artificial hill, which rises beside those which are gradually disappearing. By means of iron chains, flying bridges are thrown from the summit of the new hill to the summit of the primitive hill; and the workmen, with wheel-barrows and hand-barrows, remove the vegetable earth along these bridges.

'There appeared to be nothing peculiar in the process by which the quarries are worked; only that it is much more easy when the stone is found in vertical strata than when it lies horizontally. It sometimes happens that, in the same hill, there are strata nearly horizontal, contiguous to others nearly vertical; a geological fact, which, though not without example, is nevertheless very remarkable. The largest blocks of stone, which are reserved for the external and upper parts of the work, are extracted from the latter strata. At the foot of each section of the hill a file of cranes is established, on an extremely simple principle. The feet of these cranes rest on a sole fixed into the earth; and the heads turn in an iron collar provided with rings, to which chains are fastened; these chains, four or five in number, extend some from the top downwards, and have their point of attachment in the ground—and others from the bottom upwards, and have their point of attachment on the summit of the hill. In proportion as the excavation advances, the points of attachment of the chains are altered, and the range of cranes is extended, so that the pieces of stone detached by the gunpowder, and thrown down by the workmen, are always caught by some one of the cranes. They are each moved by means of a double handle, the axis of which has a pinion attached to it; this pinion sets in motion a toothed wheel, which acts upon the pinion attached to the cylinder, round which the chain, by which the weight is raised, rolls and unrolls. Two men are sufficient to work each crane: one links together the two ends of the chain round the piece of stone to be raised, and the other turns the handle. As soon as the stone is disengaged from those which surround it, the workman, who fixed it in the chain, pushes it with his hands, and makes the crane turn on itself, until the stone comes on a level with a flat carriage, with four small cast iron wheels, of nearly equal diameter.

'The block of stone being deposited on this carriage, the two workmen at the crane proceed to raise another piece of stone, and to place it on another carriage. These little carriages are provided at both ends with two strong iron hooks, for fastening to the traces of a horse, either before or behind, according as it may be found necessary to make the carriage advance or retrograde; for it is not made to turn upon its wheels. The wheels are placed in the grooves of an iron railway, prepared for that purpose. These iron railways meet at the different points of embarkation, and branch out to each of the cranes above described. When a carriage arrives to be loaded at the cranes, a driver is in readiness with his horse, and he fastens the traces to the hooks in front of the carriage. He drives off, proceeding a little before his horse, in order to turn the little pieces of iron, which form edges for the grooves of the rail-way, at places where two roads, crossing each other, render it necessary that the edges of the rail-way should be capable of taking two different directions. The rail-ways lead to the point of embarkation, parallel with the quay, and the carriage which runs in this direction must turn at right angles, in order that it may be embarked on board the vessel which is waiting at the quay to receive it. For this purpose, a circular plate of cast-iron is laid down, with edges which appear to be a prolongation of the rail-way. This plate, the centre of which is in the middle of the road, turns on rollers fixed circularly beneath it. It is moreover enchased in a cast-iron hoop, and fixed into the ground, to prevent it from inclining either to one side or the other. The driver having brought his carriage to the iron plate, which prolongs the iron rail-way, unfastens the horse, and turns with his hands the iron plate, with the carriage upon it, until the rail-way on the plate is brought in a line with the turn of the road leading to the vessel, perpendicular to the quay.

'A strong beam is fixed into the front of the quays. Two beams perpendicular to this, on a line with the grooves of the latter part of the railway, are fixed, with strong hinges, in front of the immoveable beam. The iron grooves of the rail-

way are carried along these two beams, which may be either raised or lowered by turning upon the fixed beam. The free extremities of the two beams rest on the edge of a port-hole, at the stern of the vessel that is to be loaded. According as the tide is either high or low, the slope of the beams changes, though the ends still rest on the port-hole. The vessels employed to convey the blocks of stone have only one deck, along which run two iron rail-ways extending from stem to stern, one on the starboard, and the other on the larboard side. Two similar rail-ways take the same direction into the bottom of the hold. A horizontal capstan in the middle of the vessel, moved by iron wheel-work, makes the carriage advance from the circular iron plate, before mentioned, to the deck of the vessel, where the carriages are ranged, so that the front of the one comes in contact with the back of the other.

'It will naturally be supposed that in order to keep the vessels steady during the loading, it is necessary, in depositing the carriages in the hold, to begin by introducing them alternately on the starboard and larboard sides. Thus the vessel is prevented from heeling either on one side or the other, which would render the operations difficult and even dangerous. In this manner sixteen or twenty carriages are put on board each vessel; six or seven on each side of the hold, and two or three on each side of the deck. With one horse for drawing the carriages to the circular iron plates on which they are turned to the point of embarkation, the driver of the horse, and six or eight men for working the capstan and pulleys, a vessel bearing sixty tons is loaded in the space of fifty minutes.

'The great works which I have here attempted to describe, the enormous masses of stone which the workmen strike with huge hammers, or precipitate from the summit of the hills; the suspended roads for conveying away the earth; the lines of cranes and their simultaneous machinery; the movement of the carriages; the arrival, loading, and departure of the vessels, present altogether, to an admirer of the great works of art, one of the most imposing spectacles that can be imagined. At certain hours the ringing of a bell announces the explosion of the quarries. The works instantly cease, the workmen retire; all becomes silence and solitude; and this silence is rendered still more imposing by the report of the gunpowder, the breaking of the rocks, the crash occasioned by their fall, and the prolonged echoes. Near the quarries there are several workshops for repairing the tools, carriages, vessels, &c. A little square building serves as an office for the engineer and a few agents, who are sufficient for the direction and completion of an undertaking the annual expenses of which amount to £100,000. The works are entrusted to two contractors: one superintends the transport of the stone, and the other the explosion of the quarries and the construction of the breakwater. The vessels employed in conveying the stone are previously gauged, and each vessel has its burden marked on scales fixed up at the stem and stern. In proportion as the vessel is loaded, the scale descends in the water, and thus the burden is ascertained. This serves for the rule by which all the works are paid. A certain sum is paid for the extraction of every ton of stone, and so much for placing it on board the vessels and conveying it to the breakwater.'

Plymouth is defended by a fortification called the citadel, which completely overlooks the entrance to Catwater, its harbour; the ramparts occupying a circuit of nearly three-quarters of a mile. West of the citadel is the Hoe, a fine grassy spot which commands most delightful land and sea views; and forms a charming promenade for the inhabitants. Beneath the citadel on the east is the government victualling establishment for supplying the royal navy with bread, and other provisions. The dock yard is situated at Devonport formerly known by the name of Plymouth Dock, which is two miles from Plymouth. This establishment commenced in the reign of William III., and is now allowed to be equal, at least, to any arsenal in the world. It is seated on the eastern bank of the river Tamar, and includes within its walls an area of seventy acres. It contains many spacious docks, and slips, covered with vast and expensive roofs, under which ships of all classes are now built and repaired. See Dock-Yards. The eye of the visitor is also struck with the view of magnificent store-houses, of workshops on an immense scale; and indeed of all that is necessary to the rapid equipment of large fleets.

The harbour, called Hamoaze, is a remarkably fine one, being four miles in length, on an average breadth of one mile. In this capacious bay, which is completely sheltered on all sides, a large number of ships, not wanted for active service, are laid up in ordinary, moored to vast chains which stretch across the bed of the harbour. North of the dock yard lies the gunwharf, which was completed in 1726. This establishment contains vast quantities of cannon, shot, &c., belonging to the vessels in ordinary; and connected with it is a large powder magazine, situated at Morice Town.

The town of Devonport owes its origin to the establishment of the dock yard, and is both extensive and well built, enclosed by fortifications which have for some years remained in an unfinished state. It is connected with the suburbs of Stoke, Morice Town, &c. From its having long been termed Plymouth Dock, it was generally confounded with Plymouth, and this occasioned, a few years since, the change of its name. The streets are built, generally, at right angles; the foot-paths are paved with slabs of Devonshire marble, obtained from quarries in the neighbourhood; and when washed by showers nothing can be conceived more beautiful than the appearance of most of the pavements. The parish church is at Stoke, about a mile distant, but the town contains two chapels of ease, and numerous dissenting meeting houses. Among several other handsome buildings are the town hall, and the public library. The column which was erected to commemorate the change of the name of the town is a prominent and interesting object. Devonport is abundantly supplied with water by a fine stream, similar to that of Plymouth, which flows a distance of thirty miles, from nearly

the centre of Dartmoor,—'the mother of rivers.' On the south of the town is Mount Wise, a gravelled plain, used as a military parade, and which commands fine views of Plymouth Sound, the Breakwater, Mount Edgecumbe, &c. Midway between Plymouth and Devonport is the town of Stonehouse, in which are situated the royal marine barracks, and the royal naval hospital, capable of receiving, at once, 1200 patients. Divided from this establishment by a narrow sea-water creek is the military hospital, a large and handsome building. At Devil's Point, the western extremity of Stonehouse, the new victualling buildings are erecting at a vast expense; but which, from their fine situation at the foot of Hamoaze, and their proximity to the waters of the Sound, must hereafter be of the utmost service in provisioning the fleets. It would not be consistent, however, with the limits of this work to enter into a detailed description of all the government establishments, military and civil, included within the limits of the port of Plymouth; those which have already been mentioned will give a sufficient idea of the importance of the place. The population, from the cheapness of the markets, and the almost unrivalled beauty of the surrounding scenery, is constantly increasing.

PLYMOUTH, formerly Saltash, a post town of Windsor county, Vermont, eighteen miles west of Windsor. A remarkable cavern was discovered in this town in 1818. It is situated at the foot of a mountain, near the head of Black River, and has five apartments, the largest of which is thirty feet long, twenty broad, and twenty high. Two of the others are nearly as large. The rocks which form the cavern are wholly of limestone. Numerous petrifactions are found here, most of which resemble icicles hanging from the rocks.

PLYMOUTH, a post town of Grafton county, New Hampshire, on the west side of the Merrimack; thirty-one miles S. S. E. of Haverhill, forty-three north of Concord, seventy north-west of Portsmouth. In the north part of the town there is a pleasant village containing a court-house, a Congregational meeting-house, and about twenty-five dwelling-houses. The courts for the county are held alternately here and at Haverhill.

PLYMOUTH, a county of the east part of Massachusetts, bounded north by Norfolk county, east by the Atlantic, south by Barnstable county and Buzzard's Bay, and west by Bristol county. Population 35,169.

The capital, of the same name, contains a court-house, jail, bank, and four houses of public worship; three for Congregationalists, and one for Baptists. The harbour is spacious, but shallow. Vessels drawing more than ten or eleven feet of water must unload in part at a distance from the wharfs. The compact part of the town is pleasantly situated, and well built, chiefly of wood. The shipping belonging to this port in 1816 amounted to 18,875 tons, and is employed in the fisheries, West India and European trade. A rivulet passes through the town which affords a valuable alewive fishery, and also furnishes seats for a number of mills and important manufactories; among which are considerable iron-works, and cotton and woollen manufactories. A fort for the defence of the town, and a light-house, are built nine miles east by north of Plymouth.

The township is extensive, containing more than eighty square miles. It is sixteen miles long, and more than five broad. The soil near the coast is generally good; the rest of the township is barren, and, notwithstanding its antiquity, is still a forest, consisting mostly of pine, though there are some tracts covered with oak. More than two-thirds of the inhabitants reside in the village. There is another village at Monument Ponds, seven miles south of the town.

Plymouth is the oldest town in New England. The first settlers landed here on the 22d of December, 1620; this anniversary is still observed. The rock on which they landed was conveyed, in 1774, to the centre of the town. Thirty-six miles E. S. E. of Boston.

PLYMPTON, a post town of Plymouth county, Massachusetts, ten miles north-west of Plymouth, thirty-two south of Boston, west 459. Population 900. It contains a cotton manufactory, a cotton and woollen manufactory, and a forge.

PLYNTERIA, a Grecian festival in honor of Aglauros, or rather of Minerva, who received from the daughter of Cecrops the name of Aglauros. The word is derived from πλυνειν, lavare, because during the solemnity they undressed the statue of the goddess, and washed it. The day on which it was observed was looked upon as unfortunate and inauspicious; and therefore no person was permitted to appear in the temples, as they were purposely surrounded with ropes. It was customary at this festival to bear in procession a cluster of figs; which intimated the progress of civilisation among the first inhabitants of the earth, as figs served them for food after they had begun to dislike acorns.

PNEUMATICS.

PNEUMAT'IC, *adj.* } Greek πνευματικος,
PNEUMAT'ICAL. } from πνευμα, breath or air. Moved by wind; relative to wind.

The race of all things here is, to extenuate and turn things to be more *pneumatical* and rare; and not to retrograde, from *pneumatical* to that which is dense. *Bacon's Natural History.*

I fell upon the making of *pneumatical* trials, whereof I gave an account in a book about the air. *Boyle.*

That the air near the surface of the earth will expand itself when the pressure of the incumbent atmosphere is taken off, may be seen in the experiments made by Boyle in his *pneumatick* engine. *Locke's Elements of Natural Philosophy.*

The lemon uncorrupt with voyage long,
To vinous spirits added,
They with *pneumatick* engine ceaseless draw.
Philips.

1. Pneumatics. This science combines the phenomena which relate to the weight, pressure, and elasticity of the air or atmosphere that surrounds our globe. Some of the more essential mechanical properties of air, have been examined under the article Air-pump; and its vitality has been fully illustrated in our view of pneumatic chemistry. Much, however, yet remains to be stated with regard to pneumatic equilibrium, which must of necessity occupy a prominent place in the present treatise.

2. Various conjectures have been formed with respect to the height of the atmosphere; and, as we know to a certainty the relative weight of a column of the atmosphere by the height to which its pressure will raise water or mercury in an empty tube, so different calculations have been founded on these data, to ascertain its extent as well as its density at different heights. If the air of our atmosphere were indeed every where of a uniform density, the problem would be very easily solved. We should in that case have nothing more to do than to find out the proportions between the height of a short pillar of air, and a small pillar of water of equal weight; and, having compared the proportion, which the height these bear to each other in the small, the same proportions would be certain to hold good in the great, between a pillar of water thirty-two feet high, and a pillar of air that reaches to the top of the atmosphere, the height of which we wish to know. Thus, for instance, we find a certain weight of water reaches one inch high, and a similar weight of air reaches seventy-two feet high: this then is the proportion two such pillars bear to each other on the small scale. Now, if one inch of water is equal to seventy-two feet of air, to how much air will thirty-two feet of water be equal; by the common rule of proportion we readily find, that thirty-two feet, or 384 inches of water, will be equal to 331,776 inches, which makes something more than five miles, which would be the height of the atmosphere, was its density every where the same as at the earth, where seventy-two feet of air were equal to one inch of water. But this is not really the case; for the air's density is not every where the same, but decreases as the pressure upon it decreases; so that the air becomes lighter and lighter the higher we ascend; and at the upper part of the atmosphere, where the pressure is scarcely any thing at all, the air, dilating in proportion, must be expanded to a very great extent; and therefore the height of the atmosphere must be much greater than has appeared by the last calculation, in which its density was supposed to be every where as great as at the surface of the earth. In order, therefore, to determine the height of the atmosphere more exactly, geometricians have endeavoured to determine the density of the air at different distances from the earth. The following sketch will give an idea of the method which some have taken to determine this density which is preparatory to finding out the weight of the atmosphere more exactly. If we suppose a pillar of air to reach from the top of the atmosphere down to the earth's surface, and imagine it marked like a standard by inches, from the top to the bottom, and still further suppose that each inch of air, if not at all compressed, will weigh one grain, the topmost inch then weighs one grain, as it suffers no compression whatever, the second inch is pressed by the topmost with a weight of one grain, and this, added to its own natural weight or density of one grain, now makes its density, which is ever equal to the pressure, two grains. The third inch by the weight of the two inches above it, whose weight united make three grains, and these added to its natural weight give it a density of four grains. The fourth inch is pressed by the united weight of the three above it which together make seven grains, and this added to its natural weight gives it a density of eight grains. The fifth inch being pressed by all the former fifteen, and its own weight added, gives it a density of sixteen grains, and so on descending downwards to the bottom. The first inch has a density of one, the second inch a density of two, the third inch a density of four, the fourth of eight, the fifth of sixteen, and so on. Thus the inches of air increase in density as they descend from the top, at the rate of 1, 2, 4, 8, 16, 32, 64, &c. Or if we reverse this, and begin at the bottom, we may say, that the density of each of these inches grows less upwards. If, instead of inches, we suppose the parts into which this pillar of air is divided to be extremely small, and like those of air, the rule will hold equally good in both. So that we may generally assert that the density of the air from the surface of the earth decreases in a geometrical proportion. This being understood, should we now desire to know the density of the air at any certain height, we have only first to find out how much the density of the air is diminished to a certain standard height, and thence proceed to tell how much it will be diminished at the greatest heights that can be imagined. At small heights the diminution of its density is by fractional or broken numbers. We will suppose at once that at the height of five miles the air is twice less dense than at the surface of the earth: at two leagues high it must be four times thinner and lighter, and at three leagues eight times thinner and less dense, and so on. In short, whatever decrease it received in the first step, it will continue to have in the same proportion in the second, third, and so on; and this, as was observed, is called geometrical progression.

3. Upon the same principle it was attempted to calculate the height of the atmosphere; by carrying a barometer to the top of a high mountain, the density of the air at two or three different stations was easily ascertained. But so feeble are human efforts in endeavouring to comprehend and measure the works of the Creator, that this theory was soon demolished. It was found that the barometrical observations by no means corresponded with the density which, by other experiments, the air ought to have had; and it was therefore suspected that the upper parts of the atmosphere were not subject to the same laws or the same proportions as those which were nearer the surface of the earth. This process has, however, been fully examined under the article Barometer. Another still more ingenious method was therefore devised. Astronomers know to the greatest exactness the part of

the heavens in which the sun is at any one moment of time: they know, for instance, the moment in which it will set, and also the precise time in which it is about to rise. They soon, however, found that the light of the sun was visible before its body, and that the sun itself appeared some minutes sooner above the horizon than it ought to do from their calculations. Twilight is seen long before the sun appears, and that at a time when it is several degrees lower than the horizon. There is then, in this case, something which deceives our sight; for we cannot suppose the sun to be so irregular in his motions as to vary every morning; for this would disturb the regularity of nature. The deception actually exists in the atmosphere: by looking through this dense, transparent substance, every celestial object that lies beyond it is seemingly raised up, in a way similar to the appearance of a piece of money in a basin filled with water. Hence it is plain, that if the atmosphere was away, the sun's light would not be brought to view so long in the morning before the sun itself actually appears. The sun itself without the atmosphere would appear one entire blaze of light the instant it rose, and leave us in total darkness the moment of its setting. The length of the twilight, therefore, is in proportion to the height of the atmosphere: or let us invert this, and say that the height of the atmosphere is in proportion to the length of the twilight: it is generally found, by this means, to be about forty-five miles high, so that it was hence concluded either that that was the actual limit of the atmosphere, or that it must be of an extreme rarity at that height.

4. If a common drinking glass or tumbler be filled with water, and a piece of bladder tied closely over its mouth, on allowing it to sink to the bottom of a vessel of water, and to stand there with its mouth upwards, the bladder exhibits no sign of being pressed upon, although it bears on its upper side the whole weight of the water directly above it, as the water beneath the bladder resists just as strongly as that above presses: but if by means of a syringe or pump, the water be extracted from within the glass, the bladder itself will then have to bear the whole pressure of the water above it, and will probably be torn or burst, the degree of pressure, and consequently the depth of water in such a case might be ascertained by placing some support, by which the action could be measured under the bladder, to sustain it after the removal of the interior water. Now this phenomenon may be exactly copied in our atmosphere or sea of air. A glass held in the hand is immersed in the fluid air, and is as full of it as the other glass was of water: its mouth may be covered over with bladder, and no external pressure will be apparent, because there is a resistance from the air within just equal to the pressure of the air on the outside; but, if the air be extracted from under the covering by means of the air-pump, the bladder is first seen sinking down and becoming hollow from the weight of the air over it, and at last bursts inwards with a loud report. By placing a circular piece of wood under the bladder for it to rest upon, and a spring of known force to support the wood, we may ascertain very nearly the weight and pressure of the air over it. The problem, however, can be solved more elegantly and accurately by means of the barometer already described. This phenomenon, illustrative of atmosheric pressure, is often shown by placing the hand on the mouth of a glass so as to cover it closely, and then extracting the air from underneath the hand, the weight of the atmosphere holds the hand down upon the mouth of the glass with considerable force. By means of the exhausting air-pump on the one hand, and of the condensing syringe on the other, all the most important facts dependent on atmospheric pressure, and its increase or diminution, may be strikingly shown. Thus to exhibit the effect of diminished pressure, water which is not heated by several degrees to the boiling point of ordinary low situations, but which would be boiling at the top of Mont Blanc, is caused to boil immediately by placing it under the receiver of an air-pump, and making a few strokes of the piston, to reduce the density of the air around it; and, if the exhaustion be rendered complete, the water will boil, even when less warm than the blood of living animals: and at any temperature, however low, water even in a vacuum assumes rapidly the form of air, or condensible vapor, but without exhibiting the violent agitation of boiling. Other liquids as spirits or ether, from requiring inferior degrees of heat to separate their particles to aëriform distances, boil under the receiver of an air-pump at very low temperatures. Ether boils when as cold as freezing water. On the other hand, to exhibit the effect of increased pressure, if we confine the particles of a liquid by still more than a common atmospheric or equivalent pressure, degrees of heat higher than the common boiling point will be required to separate them. In the diving bell at sixty-eight feet under the surface, the boiling point of water is 272° instead of 212°, and at any other depth it is higher than 212° in proportion to the depth. The fact that liquids are driven off, or made to boil, at lower degrees of heat when the atmospheric pressure is lessened or removed, has recently been applied to some very useful purposes.

5. The process for refining sugar is to dissolve impure sugar in water, and, after clarifying the solution, to boil off or evaporate the water again that the dry crystallised mass may remain. Formerly this evaporation was performed under the atmospheric pressure; and a heat of 218° or 220° was required to make the syrup boil, by which degree of heat, however, a portion of the sugar was discolored and spoiled, and the whole product was deteriorated. The valuable thought occurred to Mr. Howard that the water might be dissipated by boiling the syrup in a vacuum or place from which the air was excluded, and therefore at a low temperature. This was done accordingly; and the saving of sugar and the improvement of quality have been such as to make the patent right, which secured the emoluments of the process to certain parties, worth many thousand pounds a year. The syrup, during this process, is not more heated that it would be in a vessel merely exposed to a summer sun. In the preparation of many medicinal sub-

stances the process of boiling in vacuo is equally important. Many watery extracts from vegetables have their virtues impaired, or even destroyed, by a heat of 212°; but, when the water is driven off in vacuo, the temperature need never be higher than blood heat, and all the activity of the fresh plant remains in the extract.

6. It appears, by a paper in the fifth number of the Edinburgh Philosophical Journal, that the invention of the process of artificial desiccation under the receiver of an air-pump, and which has been ascribed to a modern philosopher, is due to Mr. Edward Nairne: a paper concerning which was published in the Philosophical Transactions for 1777. In this paper it is stated, on the authority of Mr. Cavendish, that water, whenever the pressure of the atmosphere on it is diminished to a certain degree, is immediately turned into vapor, and is as immediately turned back again into water. When the heat is at 72° of Fahrenheit's scale, it turns into vapor as soon as the pressure is no greater than that of three-quarters of an inch of quicksilver, or about one-fortieth of the usual pressure of the atmosphere; but, when the heat is only 41°, the pressure must be reduced to that of a quarter of an inch of quicksilver before the water turns into vapor. Hence it follows that, when the receiver is exhausted to the above mentioned degree, the moisture adhering to the different parts of the machine will turn into vapor and supply the place of the air, which is continually drawn away by the working of the pump, so that the fluid in the body to be dried, as well as in the receiver, will consist in a great measure of vapor.

7. If a piston move in a cylinder so as to be air-tight, and be provided with a valve which opens upwards, upon pressing the piston to the bottom of the cylinder, the air contained in the cylinder will be forced through the valve in the piston. Let us then suppose the piston in close contact with the bottom and sides of the cylinder, all air having been excluded: upon attempting to draw the piston up, it will be found that very considerable force will be necessary; and that when sufficient effort has been used, and the piston has been brought to the top of the cylinder, if it be disengaged from the agent which drew it up, it will descend with great force and strike the bottom. This effect plainly indicates the weight of the air pressing on the upper surface of the piston. This is what is vulgarly called suction; as if there were some force within the cylinder which drew the piston to the bottom. But within the cylinder is nothing but empty space, and it is plainly unreasonable to ascribe to empty space any mechanical influence. That it is the weight of the incumbent atmosphere pressing on the upper surface of the piston which forces it to the bottom of the cylinder, is still further proved by the fact, that if the upper surface of the piston be increased, the force which presses it down will be also increased, and what is more will be increased in precisely the same proportion as the surface of the piston. In fact, it is found that, when all air or other elastic fluid has been expelled from beneath the piston, there will be a pressure amounting to about fifteen pounds on every square inch of the upper surface of the piston; from which we may infer that a column of air, having a square inch for its base, and which extends from the surface of the earth to the top of the atmosphere, weighs about fifteen pounds. The atmospheric engine is a machine whose efficacy depends on the principle which we have been just explaining. In this machine the weight of the atmosphere is used as a first mover in pressing a piston to the bottom of a cylinder.

8. But there is a still more conclusive argument that it is the weight of the atmosphere which presses down the piston. If, by a valve in the bottom of the cylinder, the air be admitted below the piston, it will no longer be pressed down, or rather it will be pressed both upwards and downwards by equal forces, and will be indifferent as to its ascent or descent, except so far as the weight of the piston itself will produce the effect. This is owing to a property of air, by which it presses equally in every direction, which we shall explain more fully hereafter.

9. Many effects with which we are familiar, and which often excite our curiosity, are accounted for by the gravitation of the atmosphere. If the nozzle and the valve-hole of a pair of bellows be stopped, it will be found that a very considerable force will be necessary to separate the boards. This is owing to the air not being permitted to enter at the usual apertures, to resist the pressure of the atmosphere on the external surfaces of the boards. Shell-fish which adhere to rocks, snails, and other animals, have a power by muscular exertion of expelling the air from between the surface of the rock and the surface which they apply to it, in consequence of which they are pressed upon the rock by the atmosphere with a force of about fifteen pounds for every square inch in the surface of contact. The same cause enables flies and other animals to walk on a perpendicular plane of glass or on the lower surface of an horizontal plane, apparently suspended by their feet, and with their bodies downwards. This has lately been proved to arise from a power of expelling the air from between their feet and the surface on which they tread, so as to obtain a pressure from the atmosphere proportionate to the magnitude of the soles of their feet.

10. It may hardly be necessary to state that the animal body is made up of solids and fluids, and that the atmospheric pressure affects it accordingly. It is, however, at first view difficult to conceive how the human frame can bear a pressure of fifteen pounds on every square inch of its surface, while the person who supports the weight remains altogether insensible to its influence; but such is the fact. Experiment proves that his not feeling the fluid pressure is owing to its being perfectly uniform all around. If a pressure of the same kind be even many times greater, such for instance as fishes bear in deep water, or as a man supports in the diving bell, it must in both cases after the lapse of a few minutes pass unnoticed. Fishes are at their ease in a depth of water where the pressure around will instantly break or burst inwards almost the strongest empty vessel that can be sent down; and men walk on earth without discovering a

heavy atmosphere about them, which will instantly crush together the sides of a thick iron boiler, left for a moment without the counteracting internal support of steam or air.

11. The fluid pressure on the bodies of animals, thus unperceived under ordinary circumstances, may be rendered instantly sensible by a little artificial arrangement. In water, for instance, an open tube partially immersed becomes full to the level of the water around it, and the water contained in it is supported, as already explained, by what is immediately below its mouth:—now a flat fish resting closely against the mouth of the tube would evidently be bearing on its back the whole of this weight, perhaps 100 lbs., but the fish would not thereby be pushed away, nor would it even feel its burden, because the upward pressure of the water immediately under it would just counterbalance, while the lateral pressure around would prevent any crushing effects of the mere upward and downward forces, but if, while the fish continued in the supposed situation, the 100 lbs. of water were lifted from off its back by a piston in the tube, the opposite upward pressure of 100 lbs. would at once crush its body into the tube and destroy it. At a less depth, or with a smaller tube, the effect might not be fatal, but there would be a bulging or swelling of the substance of the fish into the mouth of the tube. In air and in the human body a perfectly analogous case is exhibited. A man, without pain or any peculiar sensation, lays his hand closely on the mouth of a vessel containing air, but, the instant that the air is withdrawn from within the vessel, the then unresisted pressure of the air on the outside fixes the hand upon the vessel's mouth, causes it to swell or bulge into it, and makes the blood ooze from any crack or puncture in the skin.

12. These last few lines closely describe the surgical operation of cupping, the essential circumstances of which are the application of a cup or glass with a smooth blunt lip to the skin of any part, and the extraction by a syringe or other means of a portion of the air from within the cup. It may facilitate to some minds the exact comprehension of this phenomenon, to consider the similar case of a small bladder or bag of India rubber full of any fluid, and pressed between the hands on every part of its surface except one, at which part it swells, and even bursts if the pressure be strong enough. In cupping, the whole body except the surface under the cup is squeezed with a force of fifteen pounds on the square inch, while in that one situation the pressure is diminished according to the degree of exhaustion in the cup, and the blood consequently accumulates there. The mere application of a cup with exhaustion constitutes the operation called dry cupping; to obtain blood, the cup is removed, and the tumid part is cut into by the simultaneous stroke of a number of lancet points, and the cup is afterwards used as before, so that the blood may rush forth under the diminished pressure. The partial vacuum in the cup may be produced either by a syringe or by burning a little spirit in the cup, and applying it while the momentary dilatation effected by the heat has driven out the greater part of the air. The human mouth applied upon any part becomes a small cupping machine and formerly in cases of poisoned wounds was used as such.

13. There is an effect of the atmospheric pressure on the living body which is rarely thought of although of much importance, viz. its keeping all the parts about the joints firmly together, by an action similar to that on the Magdeburgh hemispheres. The broad surfaces of bone forming the knee joint, for instance, even if not held together by ligaments, could not, while the capsules surrounding the joint remain air-tight, be separated by a force of less than about 100 lbs. In the loose joint of the shoulder, this support is of greater consequence. When the shoulder or other joint is dislocated, there is no empty space left, as might be supposed, but the soft parts around are pressed in to fill up the natural place of the bone. When a thigh bone is dislocated the deep socket called the acetabulum instantly becomes like a cupping glass, and is filled partly with fluid and partly with the soft solids. In all joints it is the atmospheric pressure which keeps the bones in such steady contact that they work smoothly and without noise.

14. A quantity of air or gas shut up in any vessel, and compressed, is equally affected throughout, and its tendency to escape from the pressure is equal in all directions, as is proved by the force necessary to keep similar valves close wherever placed. Hence the hydrostatic press and hydrostatic bellows, which depend for their action on this law, may be worked by air or gas, as they are by a liquid. Owing to this law, air, when allowed, will always rush from where there is more to where there is less pressure. The suddenness with which any compression made on part of a confined aëriform fluid is communicated throughout the whole is strikingly seen in the simultaneous increase in light of all the gas burners over an extensive building, or even over a town, at any instant when the force supplying the gas is augmented.

15. It must be observed, in this place, that very great condensation requires great force, and therefore small syringes. It is therefore convenient to have them of various sizes, and to begin with those of a larger diameter which operate more quickly, and when the condensation becomes fatiguing to change the syringe for a smaller. For this reason, and in general to make the condensing apparatus more convenient, it is proper to have a stop-cock interposed between the syringe and the vessel, or as it is usually called the receiver. This consists of a brass pipe, which has a well-ground cock in its middle, and a hollow screw at one end, which receives the nozzle-screw of the syringe, and a solid screw at the other end, which fits the screw of the receiver.

16. It is known that when air or any other elastic fluid is dilated, by enlarging the space in which it is enclosed, cold is produced. Messrs. Welter and Gay Lussac, who were engaged in researches concerning the heat disengaged by the gasses, when their volume is varied under very different pressures, discovered several important facts, one of the most singular of which is as follows:—The

air which escapes from a vessel by blowing through an aperture, under any pressure whatever, does not alter in temperature although it expands on issuing from the vessel. Hence it should seem to result, that heat is produced in the blowing of the air, and that this heat is so much the more considerable as the difference of pressure producing the blast is greater, so that the heat exactly compensates for the cold produced by expansion. This fact would explain the heat produced, when air enters into a vacuum, or into a space occupied by air at a less pressure. It would likewise explain why the blast of the Chremnitz machine, with a column of water produces cold, and freezes water, while the air of the Chaillot engines, where the pressure is invariable and equal to 2·6 atmospheres, does not alter the thermometer.

17. A great variety of experiments have been made to determine the elasticity of air. Those made by M. de Luc, general Roy, Mr. Trembly and Sir George Shuckbourgh, are by far the most accurate; but they are all confined to a very moderate degree of rarefaction. The general result has been that the elasticity of rarefied air is very nearly proportional to its density. We cannot say with confidence that any regular deviation from this law has been observed, there being as many observations on one side as on the other: but we think that it is not unworthy the attention of philosophers to determine it with precision in the cases of extreme rarefaction, where the irregularities are most remarkable. The great source of error has hitherto arisen from the adhesion of the mercury when the impelling forces are very small and other fluids can hardly be used, because they either coat the inside of the tube and diminish its capacity, or they are converted into vapor, which alters the law of elasticity.

18. Let us, upon the whole, assume the Boylean law, viz. that the elasticity of the air is proportional to its density. The law deviates not in any sensible degree from the truth in those cases which are of the greatest practical importance, that is, when the density does not much exceed or fall short of ordinary air.

19. Let us now see what information this gives us with respect to the action of the particles on each other. The investigation is extremely easy. A force eight times greater than the pressure of the atmosphere will compress common air into the eighth part of its ordinary bulk, and give it eight times its common density; and in this case we know that the particles are at half their former distance, and that the number which are now acting on the surface of the piston employed to compress them are quadruple the number which act on it when it is of the common density. Therefore, when the eightfold compressing force is distributed over a four-fold number of particles, the portion of it which acts on each is double. In like manner, when a compressing force of twenty-seven is employed, the air is compressed into one twenty-seventh of its former bulk, the particles are at one-third of their former distance, and the force is distributed among nine times the number of particles: the force on each is therefore three.

In short, let $\frac{1}{x}$ be the distance of the particles, the number of them in any given vessel, and therefore the density, will be as x^3, and the number pressing by their elasticity on its whole internal surface will be as x^2. Experiment shows that the compressing force is as x^3, which, being distributed over the number as x^2, will give the force on each as x. Now this force is in immediate equilibrium with the elasticity of the particles immediately contiguous to the compressing surface. This elasticity is therefore as x: and it follows from the nature of perfect fluidity, that the particle adjoining to the compressing surface presses with an equal force on its adjoining particles on every side. Hence we must conclude that the corpuscular repulsions, exerted by the adjoining particles, are inversely as their distances from each other, or that the adjoining particles tend to recede from each other with forces inversely proportional to their distances.

20. Sir Isaac Newton was the first who reasoned in this manner from the phenomena. Indeed he was the first that had the patience to reflect on the phenomena with any precision. His discoveries in gravitation naturally gave his thoughts this turn, and he very early hinted his suspicions that all the characteristic phenomena of tangible matter were produced by forces which were exerted by the particles at small and insensible distances: and he considered the phenomena of air as affording an excellent example of this investigation, and deduced from them the law which we have now demonstrated; he says that 'air consists of particles which avoid the adjoining particles with forces inversely proportional to their distances from each other.' From this he deduces (in the second book of the Principia) several beautiful propositions, determining the mechanical constitution of the atmosphere. But it must be noticed that he limits this action to the adjoining particles, and this is a remark of immense consequence, though not attended to by the numerous experimenters who adopt the law. It is plain that the particles are supposed to act at a distance, that this distance is variable, and that the forces diminish as the distances increase. A very ordinary air-pump will rarefy the air 125 times. The distance of the particles is now five times greater than before; and yet they still repel each other; for air of this density will still support the mercury in a syphon-gage at the height of 0·24 or $\frac{24}{100}$ of an inch; and a better pump will allow this air to expand twice as much, and still leave it elastic. Thus we see that, whatever is the distance of the particles of common air, they can act five times farther off. The question now becomes whether, in the state of common air, they really do act five times farther than the distance of the adjoining particles; while the particle *a* acts on the particle *b* with the force 5, does it also act on the particle *c* with the force 2·5, on the particle *d* with the force 1·669, on the particle *e* with the force 1·25, on the particle *f* with the force 1, on the particle *g* with the force 0·8333, &c.

21. Sir Isaac Newton shows, in the plainest manner, that this is by no means the case; for if this were the case, he makes it appear that the

sensible phenomena of condensation would be totally different from what we observe. The force necessary for a quadruple condensation would be eight times greater.

22. If we could suppose that the particles of air repelled each other with invariable forces at all distances within some small or insensible limit, this would produce a compressibility and elasticity similar to what we observe. For if we consider a row of particles, within this limit, as compressed by an external force applied to the two extremities, the action of the whole row of the extreme points would be proportional to the number of particles, that is, to their distance inversely, and to their density: and a number of such parcels, ranged in a straight line, would constitute a row of any sensible magnitude, having the same law of compression. But this law of corpuscular force is unlike every thing we observe in nature, and to the last degree improbable.

23. We must therefore continue the limitation of this mutual repulsion of the particles of air, and be contented for the present with having established it as an experimental fact, that the adjoining particles of air are kept asunder by forces inversely proportional to their distances; or perhaps it is better to abide by the sensible law that the density of air is proportional to the compressing force. This law is abundantly sufficient for explaining all the subordinate phenomena, and for giving us a complete knowledge of the mechanical constitution of our atmosphere.

24. The air-pump, with some of its most important experimental illustrations, must now be adverted to.

25. We have seen that the common Air-Pump, as described under that article, is materially defective in the principle on which its valves are constructed, so that it ceases to operate long ere a perfect vacuum is formed in the receiver. It may now, however, be advisable to examine an instrument contrived by Mr. Stiles, the ingenious mathematical instrument maker to the London Institution; which unites in a very eminent degree all the advantages of those that have hitherto been constructed, with the very important desideratum of performing exactly twice the work of a common double-barrel pump.

26. Fig 1, plate I., Pneumatics, represents a section of the principal parts of the pump, from which it will be seen that it is worked in the usual way, by means of a winch with a wheel and racks; this part, therefore, requires no explanation. But to the end of each rack is firmly attached, by means of the connecting pieces of brass marked *a*, *a*, the cylindrical rods *b*, *b*, passing through the collars of leather, *c*, *c*, which have reservoirs of oil in the cups above them, for the purpose of more effectually rendering them air-tight. The pistons, *d*, *d*, are solid, having no valve in them, and consist of discs of leather steeped in oil and tallow, and screwed up fast between their shoulders; they are then turned to fit the bore of the barrels.

27. The positions assumed by them as shown in the section must next be attended to. The one in barrel A is shown nearly at the end of its ascending stroke, while the piston in barrel B is equidistant from the bottom in its descending motion; the piece C is fitted in between the caps which contain the collars of leathers, and is screwed firmly to them. The barrel B is withdrawn from its cap E, in order to explain the mode of connexion between the cap and the barrel, as each cap, D and E, is similarly fastened by screws, placed at convenient distances, to the flanges of the respective barrels A and B. The angular perforated passages, *e*, *e*, as seen in the piece C, communicate with the main inlet pipe or passage from the receiver; the one leading into barrel B is seen open, and allows a free and unobstructed way for the air to enter above the piston *d*, in its descending stroke, as marked by the darts pointing downwards; while the air is also passing down the pipe F, whose connexion with the piece C is more clearly shown in the perspective view of the instrument, and through the horizontal way or channel communicating with barrel A, as shown by the letters *f*, *f*. Here the air passes through an oiled silk valve, which consists of a brass valve piece, having a hole perforated through its centre, and a small groove or nick cut in the upper part; a piece of oiled silk is strained over its surface, and secured by silk thread twisted round in the groove; this piece, with the valve, is shown in the bottom of barrel A, opening upwards, permitting the air to enter beneath the piston in its ascending motion, as shown by the darts pointing in that direction. Having thus traced the inlet ways to the top of barrel B, and bottom of barrel A, we may now describe the mechanism by means of which the top inlet valves are connected with their respective barrels. The valves we are now about to describe consist of the two metallic cylinders F and G, the first being closed, and G, which is shown open; the rods or cylinders pass through the small collars of leather, *g*, *g*, with an oil cup to each cap, as shown by the curved lines above them; which caps may be screwed up when requisite in order to press the collars of leather closer, and render them air-tight; the cylindrical valves or rods are kept in the vertical position by passing through a piece of brass, which is attached by means of screws to the under side of the head of the pump marked H; to this piece are attached two levers I and K, revolving upon the steel pins of the milled headnuts *h*, *h*. The levers work in a mortice cut to receive them in that part of the piece H shown by the letters *i*, *i*. Attached to one end of each of those levers are seen the small steel screws *k*, *k*. Two small plates of brass *l*, *l* (the front plate of each being only shown in the section), whose extremities are again attached by the screws *m*, *m*, to the pieces *n*, *n*, answer the purpose of sling rods for connecting the motion here requisite for raising and depressing the cylinders or valves according to the alternate motion of the levers I and K. The pieces *n*, *n*, are perforated, and slide freely on the valves F and G. The way in which this alternate motion takes place may easily be explained. On the back part, or opposite edge, of each toothed rack, as seen in fig. 2, is placed a plate of steel (fastened by small screws), the length of which is limited by the working stroke

of each piston, and projects on that side of each rack on which the levers are represented. The lever K is shown in the position with the valve G open, for permitting the air from the receiver to enter the top of barrel B, and the bottom of barrel A, as before described; while the lever I, with the valve F, is seen as thrown down, closing the top inlet of barrel A. We shall now suppose the piston of barrel B to conclude its descent to the bottom, having expelled the air beneath, through the outlet valve *s*, and the piston of barrel A, its ascent to the top of the barrel; the rods and racks will also pass through the same space, and, the moment the pistons reach their respective limits, the levers I and K are relieved from the opposite ends of the plates or fillets of steel; the lever I, by the action of the spiral spring *o*, which is coiled round the cylindrical valve F, and pressing between the turned shoulder *p*, and the under side of the perforated or sliding piece *n*, is then returned to an horizontal position. The lever K, by a like action, produced by the spring *q*, which is also coiled round the cylindrical valve G, and pressing between the piece of brass H, and shoulder piece N, closes the cylindrical valve G by its pressure, and its lever K, of course, takes an horizontal position. By reversing the motion of the winch, for the next stroke of the pistons, the positions of those levers are again changed by the ends of the fillets of steel, placed on the back edge of the racks, coming in contact with their extremities: The lever I is thrown up in the direction of the dotted lines, carrying with it the cylindrical valve F, which is consequently opened, and a free access for the air to enter the barrel A, above the piston *d*, on its downward motion, now takes place; the valve *f*, placed at the bottom, closes, and the air received by it is expelled through the valve *s*, which is similar in construction with the valve *f*, but in this case opens outwards, while the lever K, in consequence of the ascending motion of the rack and the fillet of steel, must come into contact with its extremity, and is thrown down on the spiral spring *o*, coiled round the cylindrical valve G, which still more effectually secures the valve in this position; the return of the air by the upward motion of the piston being also prevented. The lever K will now be in the position shown by the dotted lines, and the air received above the piston in its former downward stroke is thus expelled through the top outlet valve *t*, and passes through the side, or leading-off pipe L, in the direction as shown by the darts pointing downwards, and which communicates with the same general outlet as the bottom discharging valves *s*, *s*. A reference to the above description will show that while one barrel is discharging its contents by the upward motion of its piston, it is at the same time filling to discharge by the downward stroke. The other barrel is discharging by the downward action of the piston, and also filling through the ways described to discharge again by its upward motion, so that it performs the work of two pumps of the same capacity of barrel, constructed on the common principle. In addition to the above advantages, the mode of working the top inlet valves mechanically, insures a much more perfect vacuum than could otherwise be obtained. Thus, if we suppose the bottom inlet valves *f*, *f*, and also the discharging valves *s*, *s*, to have become leaky, by simply turning off the cock M we cut off all communication between them and the receiver; the pump then becomes a single-acting pump, with all the advantages of the common instrument. If we now suppose the top valves to be bad, in order to cut them off, detach the centre screws *h*, *h*, from the levers I and K, permitting those parts to hang loose down by the sides of the cylindrical valves; the spiral springs *q*, *q*, will then press those valves close down over the top angular inlet ways, and prevent the access of air from the receiver above the piston. If we then open the cock M, which in the former case was closed, the pump may be worked from the bottom set of valves alone.

28. The air-pump offers a variety of very beautiful illustrations, tending to prove the materiality, weight, pressure, and elasticity of the atmosphere, some of which have already been detailed under the article AIR-PUMP.

29. There is a very ingenious air-pump for the use of persons suffering from suspended animation that must here be noticed, as it combines the principle of the force-pump with that of the exhausting apparatus. Fig. 3 shows the interior of two pump cylinders, *a* and *b*, joined together, so that they make one body; in each of these cylinders is placed a piston *c*, which are both by the piston-rod *d* (passing through the line *e*) attached to the handle *f*, by means of the small screws *g*; *h* is a discharging, *i* an introduction pipe, with an opening *k*; *l* are two leather elastic tubes, with a horn band *m*, in which band is attached a small Indian rubber pipe *n*; *o* is an injection pipe with a moveable shield *p*, and *q* the screw to fix it; *r* a blade.

30. As soon as the body is taken out of the water, the two elastic tubes *n* are dipped for a moment in warm water, bent as may be found necessary, and then placed to such a depth in the nose that the horn-bands *m* are half in the nostrils, these bands being necessary to prevent the circulation through, the pipes being stopped, when the nostrils are held close by the hand of the operator. The pipe *o* is then put into the mouth, until the shield *p* is close to the lips; the latter is shifted according to the size of the sufferer, and fastened by the screw *q*, so that the pipe may go the required depth into the mouth, with the blade *r* upon the tongue

31. As soon as the breathing pump is placed in this position by the operator, who holds it in the left hand, another person, B, must hold the nose and mouth air-tight round the pipe and tubes; the handle of the piston is drawn upwards by the right hand of the operator, and immediately both pistons rise to the top of the cylinder; upon this movement the valves *s*, *u*, shut, and *t*, *v*, open; and while the cylinder *a* is filled, through the nose, with foul air from the lungs, the cylinder *b* is filled with fresh or atmospheric air through the introduction pipe *i*, the piston being pressed downwards, the valves *s*, *u*, are opened, and *t*, *v*, shout, and, while the foul air from the cylinder *a* is discharged through the pipe *h*, the atmospheric air by which the cylinder *b* was

filled, is pressed through the pipe *o* in the mouth, and consequently into the lungs, and breathing will be immediately restored.

32. The operator ought to make the strokes as regular as the breath is usually drawn, and proper care must be taken that the stomach and breast be pressed every time the piston rises in the cylinder, in order to assist the discharge of the foul air.

33. If, at the commencement of the operation, there is reason to believe that the lungs are too heavily charged with foul air, the elastic Indian rubber tubes ought alone to be brought into the nose, and, while keeping the mouth air-tight with the hand, a few strokes will immediately remove and discharge it. This operation will give room immediately for the fresh air to act with success by means of the pipe *o*, which must then be put into the mouth. Should it be wished to make an experiment to draw the foul air out by the mouth, and to introduce the fresh air through the nose, unscrew the pipe *o* and the tubes *l*; then turn the pump so that the cylinder *b* is up, and *a* downwards; the pipes and tubes are then replaced, so that *l* is joined to the cylinder *b*, and *o* to *a*.

34. The valves are placed in such a manner between the screws at the bottom of the cylinder, that they may easily be taken out and turned another way, as is shown in the drawing, so that they have different directions, and may act in either way, as is judged necessary. If it be wished to make a trial of purified air, the apparatus containing the air must be screwed into the opening *k* of the introduction pipe *i*, the gas will immediately, by drawing the handle of the pumps upwards, float out of the apparatus into the cylinder *a*; and in consequence, by the reaction of the pistons downwards, be introduced into the lungs; and should the room where the operation is performed be too close, and filled by foul air, then take a long tube, and place the funnel either out of the window, or into the next room, where the air is cool and fresh.

35. It will be perceived that the air-pump employed for pneumatic experiments depends for its efficacy entirely on the elastic quality in the air, by which, while there is any portion of air in the receiver and exhausting tube, that portion, however small, will expand and diffuse itself equally through the barrel in addition to the space it before filled. It must be pretty evident, with very little consideration, that by this process a perfect vacuum can never be produced under the receiver. For some air, however small the quantity be, must remain after every depression of the piston. Let us, however, examine how nearly we may approach to a vacuum, or, more properly speaking, let us determine what degree of rarefaction may be effected, supposing the mechanical construction of the instrument we have described to be perfect, and no obstructions to arise from circumstances merely practical.

36. At the commencement of the process the air which fills the receiver, exhausting tube, and barrel, is of the density of the external air; let its entire quantity in this state be called one. Let the capacity of the air barrel bear any proposed proportion to that of the receiver and tube; suppose that it is one-third of their united magnitudes, and therefore that it contains one-fourth of the air contained within the valve in the entire apparatus. Upon the first depression of the piston this fourth part will be expelled, and three-fourths of the original quantity will remain. One-fourth of this will in like manner be expelled upon the second depression of the piston, which is equivalent to three-sixteenths of the original quantity, and consequently there remains in the apparatus nine-sixteenths of the original quantity. Calculating in this way, that one-fourth of what is contained in the apparatus is expelled at every descent of the piston, the following table will be easily computed:—

No. of Strokes.	Air expelled at each Stroke.	Air remaining in the Receiver and barrel.
1.	$\frac{1}{4}$	$\frac{3}{4}$
2.	$\frac{3}{16}=\frac{3}{4\times 4}$	$\frac{9}{16}=\frac{3\times 3}{4\times 4}$
3.	$\frac{9}{64}=\frac{3\times 3}{4\times 4\times 4}$	$\frac{27}{64}=\frac{3\times 3\times 3}{4\times 4\times 4}$
4.	$\frac{27}{256}=\frac{3\times 3\times 3}{4\times 4\times 4\times 4}$	$\frac{81}{256}=\frac{3\times 3\times 3\times 3}{4\times 4\times 4\times 4}$
5.	$\frac{81}{1024}=\frac{3\times 3\times 3\times 3}{4\times 4\times 4\times 4\times 4}$	$\frac{243}{1024}=\frac{3\times 3\times 3\times 3\times 3}{4\times 4\times 4\times 4\times 4}$

37. The method by which the computation might be continued is obvious. The air expelled at each stroke is found by multiplying the air expelled at the preceding stroke by 3 and dividing it by 4; and the air remaining after each stroke is also found by multiplying the air remaining after the preceding stroke by 3, and dividing it by 4.

38. It appears, by this computation, that after the fifth stroke the air remaining in the receiver is less than one-fourth of the original quantity. Less than one-fourth of this will remain after the next five strokes, that is, less than one-sixteenth part of the original quantity. If we calculate that every five strokes extract three-fourths of the air contained in the apparatus, we shall then under-rate the rapidity of the exhaustion; and yet, even at this rate, after thirty strokes of the pump, the air remaining in the receiver would be only $\frac{1}{3096}$th part of the original quantity. The pressure of this would amount to about the sixteenth part of an ounce upon the square inch. It is evident that, by continuing the process, any degree of rarefaction which may

be desired can be obtained. For all practical purposes, therefore, a vacuum may be considered to be procured; but, in fact, we are as far from having a real vacuum in the receiver as ever, for such is the infinitely expanding power of air, that the smallest particle will as completely fill the receiver and barrel as the most dense substance could; that is to say, no part of the receiver or barrel, however small, will be found absolutely free from air, however long the process of exhaustion may be continued.

39. With regard to the real amount of rarefaction, it may be proper to state that Mr. Nairne having been perplexed by the disagreement of the pear gauge and the common barometrical gauges, in their indications of the degree of exhaustion in the receiver, was induced to undertake a series of experiments, in order to investigate the cause of the disagreement. He exhibited to the honorable Mr. Cavendish, Mr. Smeaton, and other members of the Royal Society of London, an experiment in which this disagreement amounted to some thousand times, and Mr. Cavendish immediately furnished him with a satisfactory explanation of the fact. 'It appeared,' he said, 'from some experiments of his father, lord Charles Cavendish, that water, whenever the pressure of the atmosphere on it is diminished to a certain degree, is immediately turned into vapor, and is as immediately turned back again into water on restoring the pressure. This degree of pressure is different according to the heat of the water. When the heat is 72° of Fahrenheit's scale, it turns into vapor as soon as the pressure is no greater than that of three-quarters of an inch of quicksilver, or about one-fortieth of the usual pressure of the atmosphere; but when the heat is only 41° the pressure must be reduced to that of a quarter of an inch of quicksilver before the water turns into vapor. Hence it follows that, when the receiver is exhausted to the above-mentioned degree, the moisture adhering to the different parts of the machine will turn into vapor, and supply the place of the air, which is continually drawn away by the working of the pump, so that the fluid in the pear gauge, as well as that in the receiver, will consist in good measure of vapor. Now, letting the air into the receiver, all the vapor within the pear gauge will be reduced to water, and only the real air will remain uncondensed; consequently the pear gauge shows only how much real air is left in the receiver, and not how much the pressure or spring of the included fluid is diminished, and that equally, whether it consists of air or vapor.'

40. Now this ingenious explanation, which Mr. Nairne considered as perfectly satisfactory, contains the fundamental principle of producing artificial dryness and cold in the receiver of the air-pump, viz. that the evaporation from any wet body, and consequently its dryness, and the cold arising from evaporation, increases with the degree of exhaustion; and, consequently, that artificial dryness and artificial cold may be produced under the receiver of an air-pump.

41. In following out the valuable principle of Mr. Cavendish, Mr. Nairne placed several fluids and wet substances under the receiver. Three grains of water in a watch-glass lost one grain and a half by evaporation in ten minutes; 100 grains of spirit of wine lost nine grains. Every substance which he tried sustained a certain loss by evaporation, excepting sulphuric acid, which always gained, by absorbing the vapor exhaled from the wet part of the pump. Having thus ascertained that the exhaustion of the air produced a rapid evaporation, and that the sulphuric acid absorbed the vapor thus exhaled, Mr. Nairne used this process for producing dry air in the receiver, in order to try the effect of the passage of the electric fluid through a dry and a moist atmosphere.

42. 'I now,' says he, 'put some sulphuric acid into the receiver, as a means of trying to make the remaining contents of the receiver, when exhausted, as much as possible to consist of permanent air only, unadulterated with vapor.' The consequence of this was, that the electrical phenomena were exhibited in the air which he had dried, and very imperfectly in air which he had made damp, by introducing a piece of wet leather, and removing the sulphuric acid.

43. The next step which Mr. Nairne takes is to produce artificial cold by the air-pump, and he gives an account of his experiment in the following words:—'Having lately received from my friend, Dr. Lind, some ether prepared by the ingenious Mr. Wolfe, I was very desirous to try whether I could produce any considerable degree of cold by the evaporation of ether under a receiver whilst exhausting. For this purpose I put the ether into a phial, the neck of which was sufficient to admit the ball of a thermometer; this being placed on the air-pump, under a receiver which had a plate at the top, with a wire passing through a collar of leather; to this wire the thermometer was fixed, by which means I could easily dip the ball of the thermometer into the ether.

44. 'The pump was now worked; and, whilst the receiver was exhausting, the ball of the thermometer was often dipped into the ether; and, when the degree of exhaustion by the barometer gauge was 65° (which was the utmost in this case that the pump would exhaust to), the degree of cold indicated by the fall of the quicksilver in the thermometer was 48° below 0° on Fahrenheit's scale; so that there was a degree of cold produced 103° colder than the air in the room where the experiment was made, the thermometer in it being at 55° above 0°. The pump was kept continually working for half an hour, and the ball of the thermometer often dipped into the ether; but no greater degree of exhaustion or cold could be produced. The air being let into the receiver, the quicksilver in the thermometer rose 10°, viz. to 38° below 0°.

45. 'Fresh ether being put into the phial to what was remaining, the thermometer rose to 30° above 0°: the pump was then worked again constantly for half an hour; yet by the barometer-gauge, the degree of exhaustion was now not more than 16°, and the degree of cold produced did not exceed 11° below 0°, as appeared by the quicksilver in the thermometer. The air being let into the receiver, the remaining ether was examined, and there were found several pieces of ice at the bottom of the phial, some of them as

big as large peas, which, when the ether became nearly of the heat of 32°, or freezing point of water, were entirely dissolved.'

46. A very elegant hydro-pneumatic fountain may be formed by employing the air pump: the arrangement of the apparatus may be easily understood. A brass plate is furnished with a receiver made to fit air-tight, and the whole may be connected by a stop-cock placed beneath. If the receiver be now exhausted of air, the stop-cock turned, and the lower extremity of the tube immersed in a vessel of water, the moment a communication is opened with the receiver a jet of water will be seen to ascend in a continuous stream. There is another mode of producing the same effect, without the intervention of the air-pump. To exhaust the receiver, in this apparatus, the lower part of the glass must, in the first instance, be filled with mercury, and a communication opened by a pipe with the cup of mercury; if the pipe be thirty inches in length, it is evident that the fluid metal must sink; and as it descends a partial vacuum will be formed within the receiver. The air then pressing on the surface of the water will drive it up the perpendicular tube, and a jet, exactly similar to the one already described, will be the result. That the air-spring causes it to expand when the external pressure is reduced may now be rendered apparent by the air-pump. To effect this, we need only place an egg beneath the receiver, from which a piece of the shell has been broken at the small end, and it will be found, on rarefying the air, that the small bubble of air contained in the large end, will, by its expansion, drive out the whole of the contents of the shell. A withered apple, or any other fruit, placed beneath the receiver of the air-pump, will immediately expand and appear perfectly fresh; but they will return to their original bulk the moment that the air is re-admitted; and a bladder about half filled with air will expand, and in some cases burst, by a similar process, the moment, however, that we re-admit the air, it will return to its original size; thus proving that no additional air was admitted, but that the spring of that which it previously contained produced the effect. This experiment may be varied by putting the bladder in a frame, and placing weights upon it, which will be raised by the expansion of the enclosed air.

47. There is a very interesting experiment that may be easily performed with a common air-pump, which is intended to illustrate the facility with which fluids boil beneath an exhausted receiver. If water, below 212° of Fahrenheit's thermometer, be placed on the pump-plate, and the air withdrawn, it will instantly boil, but on the readmission of air ebullition will cease. There is an experiment nearly analogous to this, which may be performed without the aid of an air-pump: if we half fill a Florence flask with water and place it over a lamp, letting it boil briskly for a few minutes, and then cork the mouth of the flask as expeditiously as possible, it will be found, on removing the flask from the lamp, that ebullition will still continue. The boiling may be afterwards renewed, by wrapping round the empty or upper part of the flask a cloth wetted with cold water, or by gradually pouring cold water upon its external surface; but, if hot water be applied to the flask, the boiling instantly ceases. In this manner the ebullition may be renewed and again made to cease alternately by the mere application of hot and cold water.

48. One of the most striking and self-evident proofs of the materiality of air will be found in the resistance that it offers to the motion of any body whose surface is large. The sails of a ship and a wind-mill are affected in the same way as the minutest blade of grass; and this will be equally apparent in the motion of smoke, and the devastating effects of the African or West Indian tornado. When the air is at rest in a quiescent state we can move in it with the utmost facility; but when the motion is quick, or the surface extensive, as in the fly of a clock, its resistance then becomes obvious to the senses. To illustrate this fact a double fly, with vanes of unequal size, is usually placed beneath the receiver of the air-pump, and so constructed that motion may be communicated when the air is withdrawn. When this is effected it is found that the fly that exposes a large surface to the action of the atmosphere passes round as swiftly as the smaller vanes; but, on re-admitting the air, its velocity will be very much diminished if not altogether destroyed.

49. The utility of a fly in machinery may, upon this principle, be very readily explained. A fly is an equaliser of motion, and, if we suppose that motion to be too quick, a larger surface is exposed to the resisting medium or air, and vice versâ.

50. Another mode of showing the air's resistance by means of the air-pump may now be adduced; it is well known that, bulk for bulk, feathers are lighter than gold; and, in proof of this, we find that if a feather and a guinea be dropped from the hand at the same time the latter will reach the ground first. If, however, the experiment be performed in vacuo, a very different result is obtained. If we take a tall receiver furnished with a plate at the top, and provided with an apparatus for supporting and lowering a guinea and a feather at pleasure. When this is exhausted the guinea and feather may be discharged, and they will reach the bottom at the same instant of time; thus proving that all bodies would descend to the earth from equal heights in equal times were it not for the resistance of the air. That bodies float in the air by which they are surrounded may also be shown by withdrawing a portion of the air from a large receiver, and we shall find that the weight of any enclosed body will be increased. The usual mode of exhibiting this is, to suspend a bunch of feathers at one end of a beam of a delicate balance, and attach a piece of lead of equal weight at the other. Now it will be evident that the bulk of the feathers must be greater than that of the lead, and, as such, that their buoyancy must be the greatest; so that on withdrawing the air they will cease to float in equilibrio, the feathers will descend, the equilibrium will be destroyed, and we shall find that one of the lightest substances there is will apparently become the heaviest. The exceeding minuteness of the particles of

which air is composed, may readily be shown by placing a brass plate upon an open receiver and forcing a plug of dry wood through its centre, so that the end may be immersed beneath a vessel of water. If the receiver be now exhausted, bubbles of air will be seen rapidly rising through the water, having previously passed through the pores of the wood. In proof of this, the ebullition may be immediately and entirely stopped, by closing the aperture; and, if this be effected with the thumb, it may be afterwards withdrawn and the motion renewed. A nearly similar effect may be produced by merely immersing a piece of marble in water, as, on placing it beneath an exhausted receiver, its whole surface will be found studded with bubbles of air, which have passed through a variety of minute pores in its apparently solid surface.

51. The 'Bacchus apparatus' is usually employed as an amusing mode of illustrating the action of the *lungs-glass*. The figure is seated on a cask, with a tube proceeding from the mouth of the barrel; this is filled with red wine or colored water, so that being put under a receiver when the air is exhausted, the liquor is thrown up to his mouth by the expansion of the air which is thus imprisoned, and the deity seems to be at his usual employment. While he is drinking his stomach expands, which is effected by a bladder containing a small quantity of air concealed under his external silk covering. See fig. 4, plate I., Pneumatics.

52. There is an exceedingly beautiful philosophical toy, of which the action depends chiefly on the elasticity of the air. It is a small balloon or thin globe of glass, having an opening at the bottom, and a small car or basket hanging to it. If put to float in water, while the globe contains air only, it is so light that half of it remains above the surface; but water may be introduced to adjust the specific gravity so that it may be only a little less than that of water. If such a balloon be placed in a tall jar of water, the mouth of which is closely covered by bladder, or India rubber tied upon it, or pressing such covering with the hand, the balloon will immediately descend in the water, it will rise again when the pressure ceases, and will float about, rising, or falling, or standing still according to the pressure made. The reason of this is, that the pressure on the top of the jar immediately condenses the air between the surface of the water and the cover; this condensation acts upon the water below, and, by influencing it through its whole extent, compresses also the air in the balloon or globe, and forces just as much more water into it as will render the balloon heavier than water, and therefore heavy enough to sink. As soon as the pressure ceases, the elasticity of the air in the balloon repels again the lately entered water; and the machine then becoming lighter than water ascends to the top. If the balloon be adjusted to have a specific gravity nearly that of water, it will not rise of itself after once reaching the bottom, because the pressure of the water then above it will perpetuate the condensation of the air which caused it to descend; it may even then however be made to rise again, by inclining the water jar to one side, so that the perpendicular height of water over it shall be diminished.

53. This toy proves many things—the materiality of air, by the pressure of the hand being communicated to the water below through the air in the upper part of the jar—the compressibility of air, by what happens in the globe just before it descends—the elastic force of air when, on the pressure ceasing the water is again expelled from the globe—the lightness of air in the buoyancy of the globe—it shows that in a fluid the pressure is in all directions, because the effects happen in whatever position the jar be held—it shows that the pressure is as the depth, because, a less pressure of the hand is required the farther that the globe has descended in the water—and it exemplifies many circumstances of fluid support.

54. A very important pneumatic engine, intended to raise water by the pressure of the atmosphere, must now be noticed. It is represented at fig. 5, plate I., Pneumatics. *z n* is a beam, capable of vibrating upon a centre; *a* and *b* two chambers, formed of metal, of sufficient strength to resist the pressure of the atmosphere (about fourteen pounds to the square inch) upon its external surface, and having the caps, *o*, *p*, suspended, one at each end of the beam, capable of closing each of these chambers in an air-tight manner. The chamber *b* is shown in section.

55. At *c* and *d* are two pipes, containing valves opening upwards, leading and affording a communication from the vessels *w* and *k*. These contain floats, *c*, *e*, attached to the beam *z n* by rods, which receive motion from the floats; to these rods are attached the slides *h*, *h*, to close alternately, at each vibration of the beam, the small apertures. The pins attached to one of the rods from the floats give motion to the small vibration tube *v*, which, by the rods attached to the cranks in the chamber, alternately opens and closes the pipes communicating with the vessels *a* and *b*.

56. *e* is a pipe leading from the gasometer, branching off at *e e* into the two chambers *a* and *b*, for the purpose of supplying the gas that is to be consumed in effecting the vacuum. This supply can be admitted or shut off by means of the small cocks, which open and close by cranks worked by the movement of the beam.

57. There are two other branch pipes, supplied with gas from the gasometer, and ending in a jet at each end. By the slanting directions of the ends, it is evident that the flames from these jets will, when their respective orifices *h*, *h*, be open, protrude into the chambers *a* and *b*. There are two pipes, affording a communication from the outer air to the interior of each of the chambers *a* and *b*; their outer ends are capable of being closed by means of the cranks *z*, *z*, which are attached by chains to the floats *c*, *l*. The mode of operation consists in allowing the gas to pass from the gasometer along one of the branches of the pipe *e e*, and thence into either of the chambers, where, by the jet of ignited gas playing in the orifice *h*, it becomes ignited, and by its combustion rare-

fies and expels a considerable portion of the atmospheric air from that chamber. Suppose now the cap of the chamber be put down, and, by the movement of the rod attached to the float, the orifice *h* and gas pipe be closed, the combustion will immediately cease, and leave therein a partial vacuum. The atmosphere, beginning now to press upon the vessel, will cause so much of the water to pass from it into the chamber *d* as will nearly compensate the vacuum, when the valve through which the water passed being closed, and a communication between the interior of the chamber and the open air effected by the small opening, the water contained in the chamber flows thence through the aperture, and affords power by its fall and weight on an overshot water-wheel. Thence it passes to the lower vessel, and finally is admitted by a pipe into the cistern, leaving the engine in a condition to renew the operation. It will be seen that, when the cap of one chamber closes, the several openings to the same chamber close with it; and, by the rising of the other end of the beam, the similar openings to the other chamber are opened, and prepared for a like operation. It will also be seen that the production of this motion is attained by the rising of the two floats in the opposite chambers.

58. The advantages to be derived from this engine, as detailed in the descriptive outline of the inventor, are,

59. First, The quantity of gas consumed being very small, the expense of working the engine is moderate. In its application on land the saving will be extremely great, the cost of the coal gas (deducting the value of the coke) being inconsiderable. The expense of working a marine engine will certainly be greater, as the gas used for that purpose must be extracted from oil, resin, tar, or some other substances equally portable; yet, even in this case, it will not equal the cost of the fuel required to propel a steam boat: and, as a few butts of oil will be sufficient for a long voyage, vessels of the largest tonnage may be propelled to the most distant parts of the world.

60. Secondly, The engine is light and portable in its construction, the average weight being less than one-fifth of the weight of a steam-engine (and boiler) of the same power. It also occupies a much smaller space, and does not require the erection of so strong a building, nor of a lofty chimney. In vessels, the saving of tonnage will be highly advantageous, both in the smaller comparative weight and size of engine, and in the very reduced space required for fuel.

61. Thirdly, This engine is entirely free from danger: no boiler being used, explosions cannot take place; and as the quantity of gas consumed is so small, and the only pressure that of the atmosphere, it is impossible that the cylinder can burst, or the accidents incident to steam boats occur. The power of the engine (being derived from the atmospheric pressure of ten pounds and upwards upon the square inch) may be increased with the dimensions of the cylinders to any extent, and always ascertained by a mercurial gauge.

62. It is scarcely necessary to allude to the well known fact, that, after the deduction, the friction arising from the use of the air and cold water pumps, &c., the general available power of the condensing steam engine is little more than two-thirds of its estimated amount. The cost of the machine will be less, particularly as constructed for raising water; it is therefore peculiarly adapted for draining fens, &c., or supplying reservoirs. The expense of wear and tear will also be considerably less than that of the steam engine, and, when occasionally out of order, it may be repaired at a trifling cost, and with but little delay.

63. In examining the effects of this engine, we cannot to a certain extent withhold our approbation; for the patentee has undoubtedly effected and applied a vacuum, produced by ignition, in a manner much more manageable than by the ordinary process. The probability of its entering efficiently into competition with steam power is a question that requires the data of experience, which, in the present state of the invention, can hardly be procured.

64. Having in the preceding pages fully examined the weight and pressure of the atmospheric fluid that surrounds our globe, we may now consider the motions of which air is susceptible when the equilibrium of pressure (whether arising from its weight or its elasticity) is removed.

65. In this consideration we shall avoid the extreme of generality, which renders the discussion too abstract and difficult, and adapt our investigation to the circumstances in which compressible fluids (of which air is taken for the representative) are most commonly found. We shall consider air, therefore, as it is commonly found in accessible situations, as acted on by equal and parallel forces; and we shall consider it in the same order in which water is treated in a system of hydraulics.

66. In that science the leading problem is to determine with what velocity the water will move through a given orifice when impelled by some known pressure; and it has been found that the best form in which the most difficult and intricate proposition can be put is to determine the velocity of water flowing through this orifice when impelled by its weight alone. Having determined this, we can reduce to this case every question which can be proposed; for, in place of the pressure of any piston or other mover, we can always substitute a perpendicular column of water or air whose weight shall be equal to the given pressure.

67. The first problem, therefore, is to determine with what velocity air will rush into a void when impelled by its weight alone. This is evidently analogous to the hydraulic problem of water flowing out of a vessel. And here we must be contented with referring our readers to the solutions which have been given of that problem, and the demonstration that it flows with the velocity which a heavy body would acquire by falling from a height equal to the depth of the hole under the surface of the water in the vessel. In whatever way we attempt to demonstrate that proposition, every step, nay, every word, of the demonstration applies equally to the air, or to any fluid whatever. Or, if our

readers should wish to see the connexion or analogy of the cases, we only desire them to recollect an undoubted maxim in the science of motion, that, when the moving force and the matter to be moved vary in the same proportion, the velocity will be the same. If, therefore, there be similar vessels of air, water, oil, or any other fluid, all of the height of a homogeneous atmosphere, they will all run through equal and similar holes with the same velocity; for, in whatever proportion the quantity of matter moving through the hole is varied by a variation of density, the pressure which forces it out by action in circumstances perfectly similar, varies in the same proportion by the same variation of density.

68. We must, therefore, assume it as the leading proposition, that air rushes from the atmosphere into a void with the velocity which a heavy body would acquire by falling from the top of a homogeneous atmosphere.

69. All the modifications of motion which are observed in water conduits take place also in the passage of air through pipes and holes of all kinds. There is the same diminution of quantity passing through a hole in a thin plate that is observed in water. We know that (abating the small effect of friction) it issues with a velocity similar to that acquired by falling from the surface; and yet if we calculate by this velocity and by the area of the orifice, we shall find the quantity deficient nearly in the proportion of sixty-three to 100. This is owing to the water pressing towards the orifice from all sides, which occasions a contraction of the jet. The same thing happens in the efflux of air. Also the motion of water is greatly impeded by all contractions of its passage.

70. It requires, therefore, an increase of pressure to force it through them, and this in proportion to the squares of their velocities. Thus, if a machine working a pump causes it to give a certain number of strokes in a minute, it will deliver a determinate quantity of water in that time. Should it happen that the passage of the water is contracted to one-half in any part of the machine (a thing which frequently happens at the valves), the water must move through this contraction with twice the velocity that it has in the rest of the passage.

71. This will require four times the force to be exerted on the piston. Nay, if no part of the passage is narrower than the barrel of the pump, but, on the contrary, a part much wider, and if the conduit be again contracted to the width of the barrel, an additional force must be applied to the piston to drive the water through. It will require a force equal to the weight of a column of water of the height necessary for communicating a velocity the square of which is equal to the difference of the squares of the velocities of the water in the wide and narrow parts of the conduit.

72. The same thing takes place in the motion of air, and therefore all contractions and dilatations must be carefully avoided, when we wish to preserve the velocity unimpaired. Air also suffers the same retardation in its motion along pipes. By not knowing, or not attending to this circumstance, many engineers have been disappointed in their expectations of the quantity of air which will be delivered by long pipes. Its extreme lightness of air hindered them from suspecting that it would suffer any sensible retardation. Dr. Papin, a most ingenious man, proposed that as the most effectual method of transferring the action of a moving power to a great distance. Suppose, for instance, that it was required to raise water out of a mine by a water machine, and that there was no fall of water nearer than a mile's distance. He employed this water to drive a piston, which should compress the air in a cylinder communicating by a long pipe with another cylinder at the mouth of the mine. This second cylinder had a piston in it whose rod was to give motion to the pumps at the mine. He expected, that as soon as the piston at the water-machine had compressed the air sufficiently, it would cause the air in the cylinder at the mine to force up its piston, and thus work the pumps. Dr. Hooke made many objections to the method, when laid before the Royal Society; and it was much debated there. But dynamics was at that time an infant science and very little understood, and Newton had not then taken any part in the business of the society. Notwithstanding Papin's great reputation as an engineer and mechanic, he could not bring his scheme into use in England; but afterwards in France and in Germany, where he settled, he got some persons of great fortune to employ him in this project; and he erected large machines in Auvergne and Westphalia for draining mines. But, so far from being effective machines, they would not even begin to move. He attributed the failure to the quantity of air in the pipe of communication, which must be condensed before it can condense the air in the remote cylinder. This indeed is true. He therefore diminished the size of this pipe, and made his water machine exhaust instead of condensing, and had no doubt but that the immense velocity with which air rushes into a void would make a rapid and effectual communication of power. But he was equally disappointed here, and the machine at the mine stood still as before.

73. Near a century after this a very intelligent engineer attempted a much more feasible thing of this kind at an iron foundry in Wales. He erected a machine at a powerful fall of water, which worked a set of cylinder bellows, the blow pipe of which was conducted to the distance of a mile and a half, where it was applied to a blast furnace. But, notwithstanding he took every care to make the conducting pipe air-tight, above ten minutes elapsed after the action of the pistons in the bellows, before the least wind could be perceived at the end of the pipe; whereas the engineer expected, an interval of six seconds only.

74. No very distinct theory can be delivered on this subject; but we may derive considerable assistance in understanding the causes of the obstruction to the motion of water in long pipes, by considering what happens to air. The elasticity of the air, and its great compressibility, have given us the most distinct notions of fluidity in general, proving, in a way that can hardly be controverted, that the particles of a fluid are kept

at a distance from each other, and from other bodies, by their corpuscular forces.

75. The writers on hydrodynamics have always considered the obstruction to the motion of ds along canals of any kind as arising from ething like the friction by which the motion lid bodies on each other is obstructed; but we cannot form to ourselves any distinct notion of resemblance, or even analogy between them. The fact is, however, that a fluid running along a canal has its motion obstructed; and that this obstruction is greatest in the immediate vicinity of the solid canal, and gradually diminishes to the middle of the stream. It appears, therefore, that the parts of fluids can no more move among each other than among solid bodies, without suffering a diminution of their motion. The parts, in physical contact with the sides and bottom, are retarded by these immoveable bodies. The particles of the next stratum of the fluid cannot preserve their initial velocities without passing the particles of the first stratum; and it appears from the result that they are thus retarded. They retard in the same manner the particles of the third stratum, and so on to the middle stratum. This sort of friction is not a consequence of rigidity alone, as in solids, but that it is equally a property of fluids. Nay, since it is a matter of fact in air, and is even more remarkable there than in any other fluid, as we shall see by the experiments which have been made on the subject; and as our experiments on the compression of air show us the particles of air ten times nearer to each other in some cases than in others (viz. when we see air 1000 times denser in these cases), and therefore force us to acknowledge that they are not in contact; it is plain that this obstruction has but little analogy to friction, which supposes roughness or inequality of surface. No such inequality can be supposed in the surface of aerial particle; nor would it be of any service in explaining the obstruction, since the particles do not rub on each other, but pass each other at some small and imperceptible distance.

76. We must therefore have recourse to some other mode of explication. We shall apply this to air only in this place; and, since it is proved by the incontrovertible experiments of Canton, Zimmerman, and others, that water, mercury, oil, &c., are also compressible and perfectly elastic, the argument from this principle, which is conclusive in air, must equally explain similar phenomena in hydraulics.

77. The most highly polished body which we know may be considered as possessing an uneven surface when we compare it with the small spaces in which the corpuscular forces are exerted; and a quantity of air moving in a polished pipe may be compared to a quantity of small shot sliding down a channel with undulated sides and bottom. The row of particles immediately contiguous to the sides will therefore have an undulated motion: but this undulation of the contiguous particles of air will not be so great as that of the surface along which they glide; for not only does every motion require force to produce it, but also every change of motion. The particles of air resist this change from a rectilineal to an undulative motion; and, being elastic, that is, repelling each other and other bodies, they keep a little nearer to the surface as they are passing over the eminence, and their path is less incurvated than on the surface. The difference between the motion of the particles of air and the particles of a fluid quite inelastic is, in this respect, somewhat like the difference between the motion of a spring carriage and that of a common carriage.

78. When the common carriage passes along a road not perfectly smooth, the line described by the centre of gravity of the carriage keeps perfectly parallel to that described by the axis of the wheels, rising and falling along with it. Now let a spring body be put on the same wheels and pass along the same road. When the axis rises over an eminence of perhaps half an inch, and sinks down again into the next hollow, and then rises a second time, and so on, the centre of gravity of the body describes a much straighter line; for, upon the rising of the wheels, the body resists the motion and compresses the springs, and thus remains lower than it would have been had the springs not been interposed. In like manner it does not sink so low as the axle does when the wheels go into a hollow. And thus the motion of a spring-carriage becomes less violently undulated than the road along which they pass. This illustration will, we hope, enable the reader to conceive how the deviation of the particles next to the sides and bottom of the canal from a rectilineal motion is less than that of the canal itself.

79. It is evident that the same reasoning will prove that the undulation of the next row of particles will be less than that of the first: that the undulation of the third row will be less than that of the second, and so on. And thus it appears, that, while the mass has a progressive motion along the pipe or canal, each particle is describing a waving line, of which a line parallel to the direction of the canal is the axis, cutting all these undulations. This axis, of each undulated path, will be straight or curved as the canal is; and the excursions of the path on each side of its axis will be less and less as the axis of the path is nearer to the axis of the canal.

80. Let us now see what sensible effect this will have; for all the motion which we here speak of is imperceptible. It is demonstrated in machines that if a body, moving with any velocity, be deflected from its rectilineal path by a curved and perfectly smooth channel, to which the rectilineal path is a tangent, it will proceed along this channel with undiminished velocity. Now the path, in the present case, may be considered as perfectly smooth, since the particles do not touch it.

81. It is one of the undulations only which we are considering, and we may at present conceive this as without any subordinate inequalities. There should not, therefore, be any diminution of the velocity. Let us grant this of the absolute velocity of the particle; but what we observe in the velocity of the mass is different, and we may judge of it by the motion of a feather carried along with the air. Let us suppose a single atom to be a sensible object, and let us attend to two such particles, one at the side and the other in the

middle: although we cannot perceive the undulations of these particles during their progressive motions, we see the progressive motions themselves. Let us suppose that the middle particle has moved without any undulation whatever, and that it has advanced. The lateral particle will also have moved ten feet; but this has not been in a straight line. It will not be so far advanced, therefore, in the direction of the canal; it will be less behind, and will appear to us to have been retarded in its motion: and, in like manner, each series of particles will be more and more retarded (apparently only) as it recedes farther from the axis of the canal, and what is usually called the thread of the stream.

82. And, as has been already stated, this change of place is shown to be a necessary consequence of what we know to be the nature of a compressible or elastic fluid; and that without supposing any diminution in the real velocity of each particle, there will be a diminution of the velocity of the sensible threads of the general stream, and a diminution of the whole quantity of air which passes along it during a given time.

83. Let us now suppose a parcel of air impelled along a pipe, which is perfectly smooth, out of a larger vessel, and issuing from this pipe with a certain velocity, it requires a certain force to change its velocity in the vessel to the greater velocity which it has in the pipe. This is abundantly demonstrated. How long soever we suppose this pipe, there will be no change in the velocity, or in the force to keep it up. But let us suppose that about the middle of this pipe there is a part of it which has suddenly got an undulated surface, however imperceptible. Let us further suppose that the final velocity of the middle thread is the same as before. In this case it is evident that the sum total of the motions of all the particles is greater than before, because the absolute motions of the lateral particles is greater than that of the central particle, which we suppose the same as before. This absolute increase of motion cannot be without any increase of propelling force: the force acting now, therefore, must be greater than the force acting formerly. Therefore, if only the former force had continued to act, the same motion of the central particle could not have been preserved, or the progressive motion of the whole stream must be diminished.

84. And thus we see that the insensible undulations become a real obstruction to the sensible motion which we observe, and occasions an expense of power.

85. Let us see what will be the consequence of extending this obstructing surface further along the canal. It must evidently be accompanied by an augmentation of the motion produced, if the central velocity be still kept up; for the particles which are now in contact with the sides do not continue to occupy that situation: the middle particles moving faster forward get over them, and in their turn come next the side; and as they are really moving equally fast, but not in the direction into which they are now to be forced, force is necessary for changing the direction also; and this is in addition to the force necessary for producing the undulations already so minutely treated of. The consequence of this must be, that additional force will be necessary for preserving a given progressive motion in a larger pipe, and that the motion produced in a pipe of greater length, by a given force, will be less than in a shorter one, and the efflux will be diminished.

86. There is another consideration which must have an influence here. Nothing is more certainly demonstrable than the necessity of an additional force for producing an efflux through any contraction, even though it should be succeeded by a dilatation of the passage. Now both the inequalities of the sides and undulations of the motions of each particle are equivalent to a succesion of contractions and dilatations; although each of these is next to infinitely small, their number is also next to infinitely great, and therefore the total effect may be sensible.

87. We have hitherto supposed that the absolute velocity of the particles was not diminished: This we did, having assumed that the interval of each undulation of the sides was without inequalities. But this was gratuitous; it was also gratuitous that the sides were only undulated. We have no reason for excluding angular asperities. These will produce, and most certainly often do produce, real diminutions in the velocity of the contiguous particles; and this must extend to the very axis of the canal, and produce a diminution of the sum total of motion: and, in order to preserve the same sensible progressive motion, a greater force must be employed. This is all that can be meant by saying that there is a resistance to the motion of air through long pipes.

88. There remains another cause of diminution, that is, the want of perfect fluidity, whether arising from the dissemination of solid particles in a real fluid, or from the viscidity of the fluid. We shall not insist on this at present, because it cannot be shown to obtain in air, at least in any case which deserves consideration.

89. What has been said on this subject is sufficient for the purpose of illustrating the retardation of air when passing through long and narrow pipes. We are able to collect an important maxim from it, viz. that all pipes of communications should be made as wide as circumstances will permit; for it is plain that the force to overcome it must be in proportion to the mass of matter which is in motion. The first increases as the diameter of the pipe, and the last as the square. The obstruction must therefore bear a greater proportion to the whole motion in a small pipe than in a large one.

90. Mr. Hachette has just published a very important paper illustrative of the flowing of aëriform fluids into the atmosphere, and on the combined action of the striking of the air and of the atmospherical pressure. Mr. H. commences by observing 'that the flowing of aëriform fluids into atmospheric air has recently offered several phenomena deserving the attention of philosophers. I shall adduce in the first place a very curious observation of Messrs. Gay Lussac and Welter, communicated to the Institute the 29th of April 1822, and published in the Annales tome xix. p. 436. They have confirmed this ver

remarkable fact, that the air which escapes from a vessel by blowing through an aperture under any pressure whatever, does not alter in temperature, although it expands on issuing from the vessel.' From this they have deduced the explanation of two other facts, well known, observed at Schemnitz in Hungary, and at Chaillot, near Paris. The wind or blast of the columnar machine at Schemnitz produces a degree of cold which freezes water even in summer; whilst the blast from the reservoir of air of the Chaillot engine, which is obtained under a constant pressure of two atmospheres and a half, scarcely affects the most sensible thermometer in the same season.

91. This explanation, still but little known, would perhaps be contested if it were not confirmed by the experiments of the artificial congelation of water, the analysis of which we are now about to offer, and which is obtained by a current of condensed air. Let A B C′ D′, plate II. fig. 1, be a cylindrical vessel, in which moves a piston C D, and having a cock E, which can be opened or shut at pleasure. We suppose that the part A B C D of this vessel contains atmospheric air, more or less compressed than exterior atmospheric air. The cock E being shut, and the interior air A B C D no longer communicating with the outer air, let us suppose the piston C D lowered to C′ D′. The included air will be expanded, and this dilatation will produce a fall of temperature so much the more sensible as the dilatation is greater. Let us now suppose that the piston is fixed to C D, and that A B C D is a vessel filled, wholly or in part, with condensed atmospheric air, and maintained by any means whatever at the same degree of compression. In this hypothesis, the air, at the moment of opening the cock E, will blow through E with a constant force, and the thermometer, having its bulb placed at E, will indicate no perceptible change of temperature.

92. In the first hypothesis the whole volume of air contained in the vessel expands within the vessel, and the temperature falls: in the second hypothesis only that portion of air which issues from the vessel expands outside, and the temperature of that issuing air does not alter perceptibly. Such are the facts observed by Gay Lussac and Welter. Let us examine what passes in the experiment which is repeated in all courses of natural philosophy, to show the artificial congelation of water. The receiver of a condenser is filled with air compressed to the force of several atmospheres. This receiver carries at its upper end a capillary tube, through which the air of the receiver may be allowed to escape. To this current of air a glass bulb, similar to that of a thermometer, is represented; and small crystals, scarcely visible to the naked eye, are soon formed on the outside surface of the bulb. Although the time for the formation of these crystals is very short, it is necessary to divide it by imagination into several periods. In the first period the compressed air dilates in the whole capacity of the receiver, and cools: in the following periods the air, more and more dilated, falls to a very low temperature; and, finally, in the last period, the current of air attains the maximum of cold. From this observation it results, that the small crystals obtained on the glass bulb do not proceed from the cooling of the air outside of the receiver of the condenser, but from the fall of the temperature within the receiver. This fall inside is not instantaneous. It increases by the dilatation of the air of the receiver. This air, although subject to a progressive dilatation in the whole capacity of the receiver, preserves, during its flow, an elastic force greater than that of the atmosphere, strikes against the glass bulb, and cools it. What proves that this cooling takes place is, that the atmospheric air surrounding the bulb deposits on it a slight stratum of liquid water, on which the small crystals are formed, produced by the current of air previously cooled within the receiver.

93. In July 1826 M. Doubuisson, chief engineer at the corps royal des mines, published experiments on the flow of atmospheric air compressed in a gasometer, from which it issued into the atmosphere. He found that the quantity of air expelled from the gasometer through an orifice in a thin plate, and under a determinate pressure, is to the quantity which issues through short cylindrical or conical tubes, having the aperture where the air issues of the same diameter as the orifice in a thin plate, in the ratio of 1000 to 1427. In giving an account of these experiments in the Bulletin de la Société Philomatique, for September 1826, M. Hachette remarked 'that M. Doubuisson had not made the air flow through the adjutage known by the name of the tube of Venturi, which is only a common bellows pipe reversed, the section of its greatest diameter being taken from the orifice. The air being expansible would fill that tube, and the experiment would have shown the increase of expenditure due to the acceleration of the velocity of the air on the section of the adjutage of least diameter.'

94. In October, 1826, Messrs. Thenard and Clement visited the iron foundries of Fourchambault (department of La Nierre), and the following experiment was made under their eyes:—A workman presented a piece of deal board against the blast of a pair of bellows set in motion by a steam-engine. When the board was at a certain distance from the orifice of the pipe it was strongly repelled: if it was put nearer to the plane of the orifice it was carried towards the plane, as though the repulsion had changed to attraction. This effect takes place only so far as the end of the pipe is in the plane of some object surrounding it.

95. M. Clement first discovered that the atmospheric air acted, in this case, on the board as it does on the outside of a conical pipe through which water is flowing. This philosopher returned to Paris, showed, by means of a boiler which he had at his disposal, that steam, at a pressure of two or three atmospheres, produced an effect similar to that of a blast of a forge bellows. He adapted to the boiler a vertical cylindrical pipe, terminated by a circular plate about a decimetre (3·9 inches) in diameter, in the centre of which was a circular orifice of a smaller diameter.

96. When the steam issues through that orifice, a circular disk of the same diameter as the

plate is brought near to it, and the disk carried towards the plate is observed to adhere to it, as if it were attracted by a force acting in the direction contrary to that of gravity. Points projecting more or less from the face of the disk or of the plate opposite, determined the distance of these faces apart. M. Clement stated that the facts we have just related, in a memoir which he read to the Royal Academy of Sciences December 6th, 1826, and which is referred to the examination of commissioners.

97. 'On the 11th April, 1827,' M. Hachette observes, 'I repeated M. Clement's principal experiment, at the sitting of the society for the encouragement of arts, making use of a chamber pair of double bellows, which had its nozzle terminating in a plate of copper. I announced on the same day that the adherence of a disk opposed to the plate did not depend essentially on the expansibility of the air from the bellows, and that I had obtained effects similar to those obtained by M. Clement, by making water flow between the approximated disks, the curvatures of which I had varied.

98. 'At the sitting of the Société Philomatique, on the 13th of April 1827, I presented a bent tube, by means of which, blowing with the mouth, the same phenomena are produced as by the blowing machine of Fourchambault, or by the steam boiler of M. Clement.'

99. The study of these phenomena leads to this question:—To determine the pressure in every point of the exterior and interior surfaces of a vessel which is filled with a liquid or a gas, supposing this vessel to empty itself into the atmosphere,—1st, by an orifice in a thin plate, 2nd, by an adjutage or pipe, and 3d, by a zone comprised between two surfaces brought nearly together. It is to arrive at the solution of this question, that I have endeavoured to simplify the apparatus previously employed, and have made several experiments, an account of which I have given in the following notes, which were read at the sitting of the Société Philomatique on the 28th of April:—

100. Some experiments on the flow of the gases between two surfaces brought nearly together elicited a variety of very singular phenomena. The principal fact observed by Messrs Thenard and Clement results from the combined action of the shock of the air against a plate, and of the atmospheric pressure on the same plate. All the circumstances of this action are rendered evident by means of the very simple instrument represented, figs. 7. A B C D, fig. 2, is a bent tube of tin plate or glass, terminated by a circular plate, C D, of tin. In the centre of the plate is an orifice E, of three or four millimetres (= ·12 or ·157 of an inch) in diameter. Three or four small strips of tin are soldered on the edges of the plate, and are intended to retain opposite to the plate a disk of the same diameter, and of any material we like.

101. The instrument may yet be reduced, fig. 2, to a single plate C D of tin plate, in the centre of which is a small orifice covered by a straight tube A E, soldered on the plate. For the plate, E C D, of tin, any other metal, or a slice of a large cock may be substituted. The bent tube, is seen in such a position that the plate C D may be nearly horizontal. On this plate the disk C′ D′ of any material, flexible or inflexible, is placed: now, on blowing at A with considerable force, the disk, however tight it may be, will not quit the plate. Inverting the tube, as shown in fig. 4, and adding at A a second tube A′ a, fitting close into the extremity A of the first tube A B, on blowing at A′, the wind passes through the orifice E and enters into the atmosphere by the cylindrical zone comprised between the edges of the plate C D, and of the disk C′ D′. Not only the disk does not fall, but it is driven towards the plate C D by a force greater than is necessary to be in equilibrium with its weight.

102. The tin plate strips soldered on the edge of the plate C D, fig. 4, end in a ring G H. A support, G′ H′, of cork or other materials, slides and is held between the strips, and supports a disk of paper or pasteboard C″ D″, at any desirable distance from the plate C D. Regulating this distance suitably, and blowing at A′, the disk C″ D″ will be seen to approach the plate C D, and to take the position C′ D′, very near to the plate C D.

103. The same effects will take place with the disk C′ D′, fig. 3, on blowing up the extremity A of the straight pipe A E, held in a position nearly vertical.

104. When the disk C′ D′ is flexible and a little elastic, and the experimenter blows into A, figs. 2 and 3, or into A, fig. 4, a sound is produced, resulting from the successive beatings of the disk on the plate C D.

105. The air is driven from the mouth hole A of the tube towards the orifice E of the plate C D, and strikes the part of the disk opposite that orifice, and the mean pressure on that part of the disk is greater than the atmospheric pressure. The blast of air takes the place of the air included between the plate and the disk opposite to it. It moves in that interval with a velocity which decreases from the edges of the orifice. The elastic force of that air decreases at the same time, so that the mean pressure between, and the inner face of the disk, becomes less than the atmospheric pressure, and, as the latter pressure is exerted on the whole of the outer face of the disk C′ D′, this disk, subject to two contrary pressures on opposite faces, obeys the greater; whence it follows that the disk C′ D′ must be driven towards the plate C D.

106. It is necessary for the disk C′ D′ to be near the orifice E of the pipe A E, in order that the shock of the air may be modified by the atmospheric pressure.

107. Let C″ D″ C D, fig. 5, be a vessel in the form of a cymbal, composed of a hollow cylinder, C D E F, and of a flat rim, in width equal to C″ F or G D″. Having fitted to the bottom, C D, a pipe, A E, which covers the orifice E of the diameter of three millimetres (= 0·118 inches), on blowing into A against the disk C′ D′ near the flat rim C″ D″, this disk is impelled towards the orifice E.

108. The vessel and pipe is represented, fig. 5, of about half the real size. The weight of the disk, increased by that of the bodies attached to it at P, amounts to above twelve grammes (=

185 English grains). This weight is the measure of the pressure resulting from a common blast at A in the upper extremity of the pipe A E.

109. When we have blown repeatedly on the disk C′D′, it becomes covered with moisture, and we can see the furrows of the threads of air in the direction of radii, and ending at a little circumference nearly of the same diameter as the orifice E.

110. The disk C′D′ being fifty-four millimetres (=2·13 inches) in diameter, the pressure of the atmosphere on that disk is equal to a weight of twenty-three killogrammes (= 50·74lbs. avoirdupois); whence it follows that, in this experiment, the pressure of the air blown against the inner face of the disk, and the atmospheric pressure exerted on the exterior face of the same disk, differ from each other only about one half a thousandth part of the second pressure. All other circumstances remaining the same, the form of the orifice of the plate modifies the phenomena. When that orifice is a lengthened rectangle, or a cross, fig. 3, the difference of the pressures on the opposite faces of the disk diminishes considerably. The following experiments have for their object to measure these pressures, in the situation in which, the plate and the disk being circles of the diameter, the orifice of the plate is also a circle.

111. The following experiments on the motion of air between two plane surfaces, are no less curious and important. A bent tube, B B′, fig. 6, was fitted on the sides of the chest of a smith's forge-bellows; the bellows being put in motion, by means of the lever, the air in the chest was kept at a constant pressure, which was measured by a column of water by means of a tube with a double bend, having one end fixed in the chest of the bellows. The air arrived through right-angled pipes, B, B, B, and issued from the orifice E, made in the centre of a circular wooden disk C D *c d;* another disk, C′ D′ H′, carried a solid rod or tail H′ H, passing through a plate G G′, and sliding in the case K K′, several upright, C G, D G′, are fixed in the parallel disks C D, G G. At the distance of thirteen millimetres, the pressure of air from the bellows against the interior face of the disk becomes equal to the atmospherical pressure against the face opposite. In this first series of experiments, the rod H H′ was supported by a line H Q P, passing over a pulley having its axis of rotation at R, and a weight to balance the friction, the weight of the disk C′ D′ and its rod H H′ was previously put on the disk B.

112. In order to continue these experiments, the line H P Q of the rod H H′ was detached, and the weights were placed on the platform *l l′* of that rod. When the distance between the disks exceeds thirteen millimetres (half an inch), the shock of the air predominates over the atmospheric presure, the disk is raised, the weights which maintained it at the distances stated in the first column of this table, were observed to be as follows:—

Distances between the disks C D, C′ D′.	Weights in equilibrium with the shock of the air of the bellows against the disk C′ D′.
15 millimetres = 0·59 inches	35 grammes = 540 grains E.
19 ——— = 0·75	22 ——— = 340.

113. It is evident from this table, that when the distance from the disk to the plate is only a millimetre (0·039 inch) the wind from the bellows enters into the atmosphere, through a cylindrical zone of 312 square millemetres, and its height one millimetre. When the distance is thirteen millimetres (= half an inch), the surface of the cylindrical zone is 4082 square millimetres. For the first distance of a millimetre, the zone through which the air passes is smaller in surface than the orifice; and, for the second distance of thirteen millimetres, it is ten times larger. In both cases, the action of the shock of the air blown against the disk by the bellows, is diminished by the atmospheric pressure.

114. The combination of the shock of the air and the pressure of the atmosphere, does not take place between two plane surfaces only. The plate being supposed terminated by a plane face, the opposite face of the disk may be slightly convex. A great convexity would too far remove the disk from the plate, and, if the face of the disk were concave, the shock of the air on that face would no longer be counterbalanced by the opposite atmospherical pressure.

115. The metallic plate soldered to the extremity of the bellows-pipe mentioned before, is 125 millimetres (= 4·9 inches). M. Hachette placed on this plate a disk of smooth card-board, and stuck on successively a series of pieces of paper, in order to get the number of pieces which would by their weight be equal to the atmospheric pressure, while the bellows were in motion. This number of pieces increased considerably when the disk of card-board presented a slight degree of convexity towards the plate. This effect of the change of curvature was also confirmed by experiments on the flowing of water.

116. We must now examine the motion of air between a circular plate and a flexible and slightly elastic disk of the same diameter placed upon the plate. Fig. 7 represents a disk of smooth paper rather thin, C′ D′ is put upon the plate C D, fig. 2; having wetted this disk about its centre, by touching it with a drop of water carried at the end of the finger, a gentle blast is to be given at A, the extremity of the bent pipe A B C D. The paper being a little transparent in the moistened part, the orifice E in the plate may be seen, and, during the blast at A, the wetted part swells up from the inside outwards, opposite the orifice E, and continues that curvature; the rest of the disk trembles, and a whistling or humming noise is heard; by blowing with more force the shock of the air overpowers the atmospheric pressure, and the paper disk flies away. These phenomena become more perceptible on a paper disk of greater diameter. I have put upon the metallic pipe of 124 millimetres in diameter, soldered to the extremity of the pipe of a pair of chamber bellows, a disk of brown paper, rather thick and moistened; on working the bellows the disk swells up, as in

the preceding experiment, opposite the orifice; at a certain distance from that orifice the disk is depressed, and it separates from the edges of the plate in order to allow a passage for the air. The depression stops, momentarily, the communication of the air between the centre and edges of the plate; the air, the flowing of which is interrupted, increases in elastic force, and opens itself a new passage. The preceding depression and inflections of the disk are renewed, producing very intense irregular sounds, which mix with those of the metallic plate.

117. The motion of a liquid between two surfaces must now be compared with the motion of an aëriform fluid between the same surfaces.

118. The motion of an aëriform fluid or a liquid, which we compare, takes place between the surfaces, S, S′, sufficiently near together to prevent the atmospheric air from penetrating the space between the two surfaces.

119. When the aëriform fluid contained in a vessel passes under a given pressure into that space, the fluid fills it by its expansibility, and it enters into the atmosphere through a zone which has for its limit the edges of the two surfaces S, S′, or of only one of them; the perimeter of this zone being greater than that of the orifice made in the surface S, through which the fluid issues from the vessel containing it, it follows that the velocity of the fluid is decreasing from the orifice to the edges of the zone through which it flows into the atmosphere; and, as the fluid in motion fills the whole space comprised between the zone and the orifice, it loses a very considerable part of the elastic force which it had in the interior of the vessel, in order that its mean pressure against the surface S′ may be less than the atmospherical pressure. The expansibility of the fluid is not a necessary element of the difference of the pressure exerted on the opposite sides of the surface S′. By substituting a liquid, in place of an aëriform fluid, the adherence of the liquid to the surfaces S, S′, answers instead of the expansibility: these surfaces being sufficiently near together, the atmospheric air does not introduce itself into the space which separates them; the liquid fills that space, from which it issues to enter into the atmosphere The velocity of the fluid decreases as with the aëriform fluid, from the orifice made in the surface S, to the edges of the surface S′, and the mean pressure exerted by the liquid inside, against one side of the surface S′, is less than the atmospheric pressure against the surface opposite.

120. We have hitherto considered the nature of air with reference to its motion and elasticity, without examining the effects which result from a change of temperature. Now the air that we breathe is continually operated upon in the great laboratory of nature by the action of solar and other heat.

121. The following table contains the expansion of 1000 parts of air, nearly of the common density, by heating it from 0° to 212°. The first column contains the height of the barometer; the second contains this height augmented by the small column of mercury in the tube of the manometer, and therefore expresses the density of the air examined; the third contains the total expansion of 1000 parts; and the fourth contains the expansion for 1°, supposing it uniform throughout.

Barom.	Density of air examined.	Expansion of 1000 parts by 212°.	Expansion by 1°.
29·95	31·52	483·89	2·2825
30·07	30·77	482·10	2·2741
29·48	29·90	480·74	2·2676
29·90	30·73	485·86	2·2918
29·96	30·92	489·45	2·3087
29·90	30·55	476·04	2·2455
29·95	30·60	487·55	2·2998
30·07	30·60	482·80	2·2774
29·48	30·00	489·47	2·3087
Mean	30·62	484·21	2·2840

122. Hence it appears that the mean expansion of 1000 parts of air of the density of 30·62 by 1° of Fahrenheit's thermometer is 2·284, or that 1000 becomes 1002·284.

123. If this expansion be supposed to follow the same rate that was observed in the comparison of the mercurial and air thermometer, we shall find that the expansion of 1000 parts of air for 1° of heat at the different intermediate temperatures will be as in the following table:—

Temp.	Total expansion.	Expansion for 1°.
212	484·210	2·0099
192	444·011	2·0080
172	402·452	2·1475
152	359·503	2·2155
132	315·193	2·2840
112	269·513	2·3754
92	222·006	2·4211
82	197·795	2·5124
72	172·671	2·5581
62	147·090	2·6037
52	121·053	2·5124
42	95·929	2·4211
32	71·718	2·3297
22	48·421	2·2383
12	26·038	2·1698
0		

124. If we would have a mean expansion for any particular range, as between 12° and 92°, which is the most likely to comprehend all the geodætical observations, we need only take the difference of the bulks 26·038 and 222·006 = 195·968, and divide this by the interval of temperature 80°, and we obtain 2·4496, or 2·45, for the mean expansion of 1°.

125. It would perhaps be better to adapt the table to a mass of 1000 parts of air of the standard temperature 32°; for in its present form it shows the expansibility of air originally of the temperature 0°. This will be done with sufficient accuracy by saying (for 212°) 1071·718 : 1484·210 = 1000 : 13849, and so of the rest.

Thus we shall construct the following table of the expansion of 10,000 parts of air.

Temp.	Bulk.	Differ.	Expansion for 1°
212	13489	375	18·7
192	13474	387	19·3
172	13087	392	19 6
152	12685	413	20·6
132	12272	426	21·3
112	11846	443	22·1
92	11403	226	22·6
82	11177	235	23·5
72	10942	238	23·8
62	10704	243	24·3
52	10461	235	23·5
42	10226	226	22·6
32	10000	217	21·7
22	9783	209	20·9
12	9574	243	20·2
0	9331		

126. This will give for the mean expansion of 1000 parts of air between 12° and 92 = 2·29.

127. Although it cannot happen that in measuring the differences of elevation near the earth's surface, we shall have occasion to employ air greatly exceeding the common density, we may insert the experiments made by general Roy on such airs. They are expressed in the following table; where column first contains the densities measured by the inches of mercury that they will support when of the temperature 32°; column second is the expansion of 1000 parts of such air by being heated from 0° to 212°; and column third is the mean expansion for 1°.

	Density.	Expansion for 212°.	Expansion for 1°.
	101·7	451·54	2·130
	92·3	423·23	1·996
	80·5	412·09	1·944
	54·5	439·87	2·075
	49·7	443·24	2·091
Mean	75·7	434	2·047

128. We have much more frequent occasion to operate in air that is rarer than the ordinary state of the superficial atmosphere. General Roy accordingly made many experiments on such airs. He found in general that their expansibility by heat was analogous to that of air in its ordinary density, being greatest about the temperature 60°. He found, too, that its expansibility by heat diminished with its density, but he could not determine the law of gradation. When reduced to about one-fifth of the density of common air, its expansion was as follows :—

Temp.	Bulk.	Difference.	Expansion for 1°.
212	1141·504	7·075	0·354
192	1134·429	12·264	0·613
172	1122·165	14·150	0·708
152	1108·015	14·151	0·708
132	1093·864	14·228	0·711
112	1079·636	14·937	0·747
92	1064·699	20·911	1·045
72	1043·788	25·943	1·297
52	1017·845	17·845	0·892
32	1000·000		
	Mean expansion		0·786

From this very extensive and judicious range of experiments it is evident that the expansibility of air by heat is greatest when the air is about its ordinary density, and that in small densities it is greatly diminished.

129. The facts we have now been examining lead us to a very important part of domestic economy, namely, the best mode of heating and ventilating houses by reference to a change in the atmospheric density, but new and more valuable information has since been furnished by the researches of Mr. Tredgold.

130. In winter we require artificial heat, and during a short part of summer we seek for coolness, but at all times we need pure and wholesome air. These, however, are comforts which are not always to be commanded, and particularly where we desire to join economy with healthiness and comfort. The principles concerned in the movement of invisible elastic fluids are seldom understood by those who engage in the management of ventilation; and, on the still more recondite subject of heat, we too often find that the most absurd opinions are entertained. On the other hand, persons rarely take the trouble to think for themselves; and, most likely, because very little pains have been taken to reduce the subject to principles, or to render it accessible to those who would wish to be acquainted with it; and more especially those who would wish to be able to distinguish quackery from science.

131. This seems an anomaly that can be explained only by the powerful influence of habit, which leads us in the steps of our forefathers, while in other arts changes have been made which render it necessary to improve the ventilation of our dwellings. For in their large mansions the wind was suffered to blow freely through them, and a current of air to circulate through the wide space between the pannelled wainscot and the wall. It must be habit also that renders the constant attendance at the bench or the bar supportable in the noxious atmosphere and elevated temperature of a court of justice. It must be habit which causes the offensive effluvia of a hospital to be disregarded by medical men,—for surely these are not necessary evils; but before I visited hospitals, courts, manufactories, and poor-houses, for the express purpose of seeing how they were ventilated, I had no idea of the magnitude of these evils. All places are not equally ill ventilated, for there are some

where it is much more effectively done than in others; and in a few cases I have observed that cleanliness has in some degree compensated for the want of fresh air.

132. We owe much to the labors of Dr. Hales on this interesting subiect; but most, if not all, of those who have attended to it since he wrote, have confined their attention to improve the means of admitting that quantity of air which Dr. Hales had shown was injured by respiration. If such a change would have preserved the mass of air in a room in a state of purity, the prime object of ventilation would have been accomplished; but it is an obvious truth, that, unless we extract all the air which is injured, it must accumulate; for, in consequence of the tendency of gaseous bodies to mix, when suffered to remain long in contact, the air given off from the lungs must mix with, and so far deteriorate, all the air in the room. Now, the mere change of a portion of this mixture for an equal portion of fresh air, will only improve the air of the room, by the removal of as much of the whole quantity of injured air, as is expressed by the fraction of which the numerator is the air extracted, and the denominator the bulk of air in the room. Therefore, either a very great proportion of air must be removed by ventilation, or we must endeavour to find the means of removing that which is unfit for supporting life, as soon as it is generated.

133. In practice it is always inconvenient to introduce fresh air in large quantities; it is expensive in winter, and fills every thing with dust in summer; and, in this variable climate, the process becomes quite unmanageable in spring and autumn. Hence we are compelled to seek for the means of removing the noxious air before it has had time to mix with the air of the room; and we are not a little encouraged in the research, by observing that our Creator has provided for the removal of the air we eject from the lungs in such a manner that we cannot inspire it again in a free atmosphere. The air in respiration loses its oxygen, and this loss is replaced by about an equal bulk of carbonic acid gas, which is heavier than oxygen in the ratio of 1 : ·725; but the air expelled from the lungs is given out at a temperature of about 90°, and is nearly, if not quite, saturated with the quantity of vapor due to that temperature, which vapor and azote are both lighter than common air. Consequently the mixture of azote, carbonic acid gas, and vapor ejected from the lungs, is specifically lighter than common air, and ascends with considerable velocity; the remarkable pause, which occurs immediately after an expiration, gives time for its ascent, and for a fresh supply of air to approach for the succeeding inspiration.

134. It may be remarked that the ejected air gradually diffuses itself among the air it rises through, which renders it necessary to provide for the removal of a much greater quantity than that which is expired; but it will be evident that, if the whole mass of air be ascending with a slow current, and there be apertures for its escape at the top of the room, the diffusion will be less than in still air, and much less than it would be if the ascent were interrupted by descending streams of cold air. While the vitiated air retains its heat, it may easily be shown that it will be lighter than common air, and consequently will ascend with greater velocity, and go off by the apertures; but if it be retarded, so as to become of equal temperature with the common air, it will descend, become diffused, and deteriorate the rest of the air in the room.

135. It will be evident, then, that ventilation should be continual, during the time a room is in use; that the heated air should be given out at the highest parts of the room, and the cooler fresh air should enter at the lower parts. That, previous to a room being used, it should be ventilated freely; and also immediately after it has been used, in order that any effluvia, which has collected through imperfect action of the ventilating process, may be removed. In warm weather, the latter change would be assisted by washing, or sprinkling with water.

136. But it is too common to let a room acquire an oppressive temperature before ventilation is given; to provide no places for supplying cold air, except what chance furnishes; or, if it be supplied at all, it is at the upper part of the room, so as to interrupt the ventilation, instead of amending it.

137. It will sometimes happen, that, through want of attention to ventilation, the air will arrive at that state of density which renders it in equilibrium with the external air, though of a higher temperature. In such a case, opening windows, or ventilators, produces no effect in still weather; and it becomes necessary to resort, either to mechanical power, or heat, to change the air. In hospitals, and buildings of a like description, it is therefore desirable to provide such means of ensuring a regular change of air.

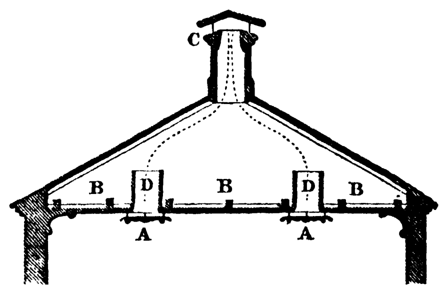
138. In considering the principles of ventilation, it must be obvious, that it is much more necessary in some places than in others; in isolated houses it may be neglected with impunity, but, in the confined streets of extensive towns, it must not be left to chance. Even in planning towns, the importance of thorough scope for the winds to follow the valleys, should be regarded, that the heavy impure air may be driven away. When a narrow street crosses a valley, without being crossed by another street, at the lowest part, it becomes very difficult to keep it in a proper state. But, in many cases, we meet with streets on level ground, planned as if it were to render it impossible for a current of air to follow them; and, from the very circumstance of their not being pervious to the fresh air, they become the resort of the wretched, with a tenfold increase of filth and misery. By forming the New Street in London, much good has been done; and one cannot well let this opportunity pass without expressing a wish that other openings may be effected, planned with a more direct view to the health and convenience of the metropolis, unencumbered by massive colonades. The giant members of the Doric column were never designed for a screen to a toy shop.

139. The usual construction of prisons renders them similar to the interrupted and confined streets of towns, but the improvement of raising

the cells above the ground story must be very beneficial; and the extensive area, enclosed by walls, and the isolated buildings of some of the best prisons, must render them very healthy, when a proper attention to cleanliness is observed. An elevated site is clearly the best for any building which is to be enclosed by high walls; there should be as few internal divisions of the area as possible; and long rectangular yards, with open railing at the ends, seem better adapted for ventilation and exercise than the polygonal figures of many of our new prisons, and, perhaps, quite as favorable for other objects. Where a prison is in a low and unhealthy situation, it would be desirable to adapt a machine for changing the air of the prison to the tread-wheel to work, where there was a deficiency of more profitable employment for the power. This would surely be better than either working vanes against the wind for no purpose, or working against the friction of a brake-wheel.

140. The atmosphere of London is truly a problematical subject; but it is important that it should be studied. It contains upwards of a million of human beings, each of which consumes thirty-two cubic inches of oxygen per minute, and ejects an equal bulk of carbonic acid gas in the same time; there is also an immense number of animals, all tending to vitiate the atmosphere. The greater part of the carbon of nearly two million chaldrons of coals is also converted into carbonic acid gas in one year, at the expense of an equal bulk of oxygen. But the evolution of so much carbonic acid gas, immense as it is, almost always takes place at a temperature, and under circumstances, very favorable for its diffusion in the atmosphere; while the power of the carbon to absorb animal effluvia very probably renders it an important agent in improving the quality of the air of the metropolis. We must, however, regret, that the ascending currents of smoke are almost always charged with considerable quantities of soot; and that, of the ingenious methods which have been tried to remedy this inconvenience, very few have been, in any material degree, successful. There are two principles which may be resorted to; the one consists in causing the soot to precipitate from the smoke before it ascends, or during its ascent up the chimney; the other consists in providing the means to consume the soot; and, whichever of these principles be acted upon, the draught of the chimney will be impaired. Hence, for all operations which require a strong fire, there must either be a very high chimney, or the neighbourhood must be annoyed by smoke. A well managed fire will afford very little sooty smoke when it is properly constructed; but how difficult it is to get a fire well managed; and, therefore, while exertion to reduce the quantity of sooty smoke should be encouraged, we can scarcely expect more than a slight amelioration of the evil. But, while the more extended benefit of open streets, and the free access of currents of fresh air, must be left to the care of public bodies, it is in the power of individuals to increase and improve the ventilation of their own dwellings.

141. It has already been noticed that the air which is given out in respiration is lighter than common air of the same temperature; and that, being of a greater temperature than common air, it ascends as soon as it is expelled from the lungs: hence its proper outlet is at the upper part of a room; but, in some cases, the same opening will give admission to a stream of cold air, unless it be of a peculiar construction. To avoid this defect, there should be a free supply of fresh air to the lower part of the room, and the openings contrived so that their action shall not be interrupted by winds. It will be found an advantage to let the ascending air flow into the space between the ceiling and roof. We will suppose a case where the vitiated air passes immediately through the ceiling into the space in the roof, as shown in the accompanying diagram,



where its course is indicated by the dotted lines, the apertures through which it ascends being concealed by ornamental plates A A, placed at a little distance below them. If cold air be forced in at the top or otherwise, it will occupy the lower part of the space, as at B B B, and cannot make its way into the tubes D D, unless it be in greater quantity than fills the space above the level of the tops of these tubes. The top C should not be longer than is required for the intended purpose, and the greater height it has the better, but it should not, in any case, be higher than the chimneys of the building, as it may cause them to smoke. Where a room is required to be ventilated, and is not next the roof, the air-tube should be got by the most favorable direction into the space in the roof. In all cases the apertures should be provided with registers that can be opened or closed at pleasure. The most simple is constructed in the same manner as the throttle valve of a steam engine. It consists of a plate A, fixed on an axis in some part of the air-tube, and is represented in the diagram.

It should not be made to move too easily, in order that it may stand at any opening at which it is set.

142. The apertures for admitting fresh air ought to be abundantly large, and covered with wire-gause, that rapid currents may be avoided. The modern mode of finishing rooms is not well

adapted for admitting fresh air, as it seems to have been a direct object of research to exclude it. But it is only necessary to provide the means of warming fresh air before it enters, during the winter season, and then the motive for excluding air is done away, and the same channel may supply it in summer, when it becomes as agreeable as it is necessary.

143. When workmen were less skilful, our apartments had a plentiful supply of air, and the want of ventilation was never felt; but now that walls are rendered impervious to the air by plastering, and floors are made double, and doors and windows are fitted with scrupulous accuracy, the consequent decrease of the fresh air admitted renders it necessary to attend to ventilation, which formerly there was very little reason to provide for. Yet, it must be admitted, that, with a system of ventilation which we can regulate, in respect to quantity, at pleasure, rooms must be more comfortable than when the wind entered on every side, and could not be excluded. When one improvement is effected many others become evidently desirable; it is thus that art has made such rapid strides of late years; but the improvement in the construction of buildings has been slow, compared with that in some other arts, and the effect of close rooms on health has not been so soon nor so distinctly perceived, as one would have expected. The comfort of a warm room is sought for much more than that of a pure and healthy atmosphere.

144. It has been shown that there ought not to be less than four cubic feet of air removed per minute by ventilation for each individual in a room; and in the same work the following rule is given for the area of the ventilators through which the heated air is to ascend. Let N be the number of people the room is intended to contain, h the height from the floor of the room to the top of the ventilator tube in feet, T the temperature of the internal air, and t the temperature of the external air; then,

$\frac{N}{75}\sqrt{\frac{450 + T}{h\,(T-t)}}$ = the area of the ventilator in feet. It will be obvious that the largest ventilation is required when there is only a small difference between the temperature of the external and internal air. When the difference does not exceed 10°, and the internal air is at 60°, then, $\frac{\cdot 95\,N}{\sqrt{h}} =$ the area of the ventilator in feet or $\frac{N c}{\sqrt{h}} =$ area with sufficient accuracy.

145. There will be much advantage in dividing this area, so that the air may rise through several outlets instead of one; and, consequently, operate more uniformly in ventilating the room. When the cold air enters, the apertures should be not less than double the area of the outlets for hot air.

146. The same rule applies to the ventilation of churches, courts of justice, and the like; and it is exceedingly simple and easy of application.

147. It is not difficult to cause the ventilators to open or close in proportion to the temperature of the room. The difference between the expansion of iron and zinc rods might be made the means of opening the registers, whenever the temperature rose above the intended degree. The same thing may be done by expansion of mercury; and, perhaps still easier, by the expansion of air. Attendants seldom think it necessary to open ventilators till the heat has become oppressive; the influx of cold air is then dangerous; and, therefore, it is desirable that ventilation should be self-acting. They should begin to open as soon as the temperature exceeds 54° of Fahrenheit, and be quite open at 70°.

148. In cases where the ventilation is likely to be interrupted by winds, it may be much assisted by placing a lamp in the upper tube, the heat of which will serve to maintain an ascending current; but it will in most cases be quite sufficient to depend on the heat generated by the individuals in the room; which must, at least, be sufficient to raise the temperature of four cubic feet of air 10° in a minute for each individual. The advantage to be derived from using a lamp, consists in establishing a current at first, and, by that means, preventing the cool walls from condensing the vapor when many people assemble in a room that has not for some time been used.

149. The principles of warming buildings depend on the laws by which hot bodies communicate heat, limited by the circumstance that the air which is to be respired, must not be injured by the heating surface. And it is obvious that the quantity of heat required must depend very much on the closeness of the windows and doors, the kind of walls, and the proportion of windows. The effect of different kinds of walls will be most sensible in the time necessary to raise the room to its proper temperature, but the escape of heat from doors and windows will be constantly taking place. It may be shown that each foot of surface of glass will cool about one cubic foot and a half of air per minute, from the temperature of the room to that of the external air; and hence the loss of heat from windows is easily estimated. To the loss of heat from the windows must be added the quantity for ventilation, and an allowance for other causes of loss should be made. We then have no difficulty in proportioning the quantity of heat, and reducing that to a regular system which has been conducted by guess. A minute is made the measure of time in both cases, and a cubic foot the measure of the quantity of air heated or cooled. That is, if there be 150 cubic feet of air cooled per minute by the windows, and 400 cubic feet per minute changed for ventilation, and fifty cubic feet be allowed for loss by apertures; then there must be $150 + 400 + 50 = 600$ cubic feet of air warmed per minute, to maintain the room at the proposed temperature.

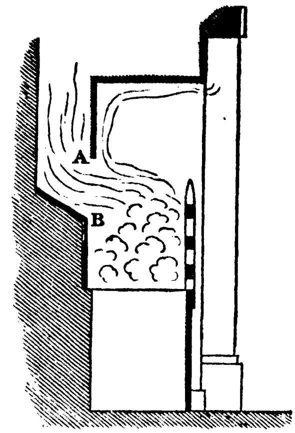
150. The bulk of air in a room has no concern in such calculations; but the temperature is more slowly obtained, after setting the apparatus to work, when a room is large, both on account of the greater quantity of air to be heated, and the greater extent of walls, floors, &c., to be warmed. What an immense length of time it would require to warm the walls and air of a

large cathedral, while its height must render it nearly impossible to warm it by hot air. The only course that could be relied upon in such a case would be to communicate the heat as directly as possible to the solid matter of the seats, &c., instead of expending it upon air to rise to the upper regions of the building.

151. But we have yet to consider how a hot body communicates its heat, and the temperature to which its surface should be limited, when the air is to be warmed at that surface.

152. A hot body radiates or projects heat through air from its surface; and it also communicates its heat to any solids or fluids in contact with it. Both these methods of communicating heat are employed in warming buildings. There are cases in which it is not prudent to employ radiant heat, but in all cases where it can be employed with safety, the union of the two methods renders the place which is warmed most healthy and agreeable.

153. To afford radiant heat, we have a fire in an open grate, so constructed as to expose a considerable surface to send out heat; and all the other parts of the fire-place, in contact with the fuel, should be slow conductors of heat, such as fire-brick and the like. To understand the reason of this precaution, we have only to consider that fuel does not send out radiant heat freely till its temperature be about 800°; and, as a given quantity of fuel only supplies a certain quantity of heat in a given time, it is obvious that, if we expose too much surface at a temperature of 800°, more heat will be given out than the fuel can supply, and the temperature of the fire must be lowered, or will burn dead, as it is termed. If the back of the grate containing the fuel be of iron, the surface of hot fire must be less than when slow conductors are used, because there will be a greater loss of heat through the iron back. It is often attempted to employ the heat which is given off by an iron back to warm air; but air warmed in this manner is burnt, and unfit for respiration, besides creating a great deal of dust; and the loss of radiant heat is nearly equivalent to the quantity communicated to air in that manner. It is one of the advantages of an open grate, when properly constructed, that it allows all the burnt air, and the noxious gaseous matter from the fuel, to escape up the chimney, as they are formed; but this desirable property does not belong to all kinds of grates, even when their chimneys are good, and not liable to smoke. In order that the arrangement may produce the effect, the entrance to the chimney should be immediately above the fire, and large enough to give passage to the smoke, burnt air, &c., from the fire; it should not be larger, because, then, too much air will be abstracted from the room, and much heat will be lost. This leads me to notice a defect of a species of grate, lately much in use, in which the opening for the smoke is at the back of the grate, and very little above the level of the fire; as shown in the diagram, where the smoke passes through a long narrow opening at A B. A chimney of this kind will not act, unless it has a powerful draught; and the greater the draught is, the less effect will be obtained from the fire; but, however powerful



the draught may be, a quantity of sulphureous vapor and burnt air will be intercepted at A, by the thin edge of the plate in which the aperture is made, and rise into the room. Common iron-stoves, with open fires, and descending flues, have the same defect; they are very commonly employed for warming shops and counting-houses in London, but are only felt oppressive where the doors are not opened with sufficient frequency to change the air of the place very often.

154. Where air is not in any degree injured by fire, but merely heated, it is felt oppressive; because, air being increased in bulk by heat, we must either take a greater quantity into the lungs at once, or breathe oftener in the same time, to obtain that quantity of oxygen our system has been accustomed to absorb But the diminished proportion of oxygen, in a given bulk of air, is not the only cause of our feeling oppressed in heated air; for, by heating air we increase its power of abstracting moisture from us. If a room be warmed by radiant heat alone, the solid matters in the room are warmed, without heating the air to the same degree, because radiant heat, passing through the air, does not materially increase its temperature.

155. The impressions of radiant heat diminish as the squares of the distance from the fire, and consequently extend, so as to be effective, to a small distance only. This suggests the expedient of employing a moveable screen, to receive the impressions of heat, and protect the family circle from the influx of cold air, from the distant parts of the room. Such a screeen may be contracted or expanded, according as the weather is more or less severe, and entirely removed in summer. The Chinese or Japanese screen is partially used for this purpose, but the taste of our countrywomen is capable of giving it more appropriate ornaments, and of rendering it as interesting as it is useful.

156. The lively and cheerful blaze, and genial heat, of an open fire, is not, however, to be obtained at a small expense; and, by other methods, the same room may be warmed by one-third of the fuel required by an open fire. These methods I shall proceed to explain, noticing every variety that is not objectionable by being injurious to health.

157. In the methods now about to be described, warmth is communicated by contact; and, since the heat is ultimately communicated to the air of the place which it is the object to warm, it is of the utmost importance that that air should not be injured by the hotness of the surface from which it obtains heat. The fact that air receives no injury from a surface of the temperature of boiling water is very well ascertained; and, perhaps, it may pass over a surface heated to 300° without material injury, but not when the temperature is higher. Air which has passed over red-hot iron, or red-hot brick, acquires a disagreeable odor, and, in respiration, produces a harsh dry sensation in the organs, and a tendency to cough. Air which has passed over the same surfaces, with their temperatures under 300°, is mild and agreeable. The precise nature of the change which an excess of heat produces in air is not, perhaps, thoroughly understood, but it is supposed to consist in a partial combustion of the particles of animal and vegetable matter suspended in the air; it is a change, however, which produces a very sensible effect on any person who lives a considerable portion of his time in air which has undergone it.

158. Hence, in selecting those methods which are adapted to give warmth to the air of an apartment, it will be desirable to avoid those where the air must be in contact with surfaces of a higher temperature than 300°, and even that should be considered the extreme limit of the heat of a surface to warm air. To confine the temperature of the heating surface within this limit excludes so many of the usual methods of warming that we have only few left to consider.

159. The most useful for small houses is that where the fuel, &c., is confined by such a thickness of matter that the external surface cannot be heated beyond 300°. A stove of this kind should be as completely insulated as possible; so that the heat of the fire, and of the smoke and hot air passing through the flues, may be given out to the air it is intended to warm. The flues will be effective, with a good chimney, at a horizontal distance of forty feet from the fire, and of from fifty to sixty feet where the flue rises, either regularly or by steps. It is sometimes necessary to make flues descend again, before the smoke passes into the chimney; but this renders them liable to explode, whenever the fire is so mismanaged as to fill the flues with gas. In hot-houses for plants, the flues are extended in one direction so as to afford as equable a heat as possible to a considerable length of house; but, in other cases, the flues may be made to wind backwards and forwards, so as to occupy only a small horizontal space, of which we have an example in Swedish stoves. The materials of these stoves should be of such a nature that the air may be warmed against the surface, without becoming loaded with dust. Indeed all passages for air to circulate through should be hard, smooth, clean, and durable. The wear of soft bricks, mortar, &c., by the friction of air, is much more considerable than those who have not observed it with care can have any idea of; and, besides the disagreeableness of dusty rooms, it is not desirable to inhale air charged with particles of brick and mortar. When the matter of the stove is of sufficient thickness to limit the temperature to the proposed degree it is not economical to make it thicker, unless the fire be kept on only a certain time, and then the damper and the ash-pit both shut close, so that no air can pass through the flues: then a considerable mass of materials will afford a regular supply of heat for a long time after the fire is out; and you have to wait nearly as long a time before the stove affords any heat, if it be suffered to remain till it be cold. In fact, it requires a regular and systematic attention to manage such a stove, which renders it unfit for our uncertain climate, where the weather would very often change before the stove could be rendered capable of affording its warmth. Consequently, it is an obvious advantage to have the parts of the stove no thicker than is required to limit the temperature of its surface, because it then affords its heat speedily, and no attention to closing valves or dampers is necessary; and yet the mass of heated matter round the fire-place is considerable, and therefore it is not very soon cooled, if the fire be neglected. As the length of horizontal flue is limited, and it is not convenient to make any material change in the size of the flues, the power of the stove is usually regulated by the size of the fire-place; but it is better to do it by the area of the aperture into the chimney; for then we can have a slow fire, which will require less attention. By a quick fire, we gain most heat from a given quantity of fuel, but it requires constant attention; hence, where labor is more valuable than coal, a slow fire should be preferred. The area of the aperture into the chimney may be determined by the rule $\frac{10\,c}{\sqrt{h}} = a$. Where c is a number of pounds of coal to be consumed in an hour, h the vertical height of the chimney in feet, and a the area of the aperture in inches, and if the quantity of air to be warmed per minute, in cubic feet, be multipled by 0·00472, the results will be the pounds of coal which the stove to warm it should consume in an hour.

160. Where a greater quantity of fuel than ten pounds of coal per hour is required to sustain the temperature, it will be necessary to have two stoves; as this is better than increasing the surface of the flues.

161. In these rules, the fire is estimated to be capable of keeping the temperature of the room 30° above that of the external air, when it is supplied with Newcastle coal; and the fire being rendered capable of regulation by a damper in the chimney, and a register at the ash-pit, it is easy to have any variation of heat within that range.

162. In churches, and buildings of a like kind, the whole of the air, or nearly the whole, may be supplied to the stove from within the building; but, in smaller buildings that are in more frequent use, a part of the air should be brought from the exterior, and the rest from the interior; the relative proportions of which will be determined by what has been remarked in treating the subject of ventilation.

163. Enough has, perhaps, been said respect-

ing the properties and powers of stoves of this kind; and if the importance of the principles of limiting the temperature of the surface, and of preventing the heated air becoming charged with minute particles of dust be admitted, it must be acknowledged that very few of the contrivances called stoves are proper instruments for affording heat.

164. About the year 1796 a new method of limiting the temperature of a surface, for affording heat, was discovered by Messrs. Strutt of Derby. It consists in placing the surface at such a distance from the fire that its temperature cannot exceed 300°; and as, from the nature of the arrangement, this surface can only be of small extent, it was found necessary to direct the air in small streams against the heated surface with great velocity, to cause it to absorb a greater quantity of heat, and by that means compensate for want of surface.

165. It will be obvious that, in this arrangement, the fire should either be raised in an open grate in the centre of the cockle (for that is the name given to the vessel which is heated), or the fire should give off heat through sides of slow conducting matter;—the latter appears to be the plan adopted by Messrs. Strutt. It will also be evident that the smoke of the chimney cannot be brought to a lower temperature than that of the surface giving off heat, unless it be given off through the sides of the flue which conducts it to the chimney. Consequently, the whole of the heat cannot be obtained without in part employing the principle we have already considered. It has already been remarked that, in employing the cockle, we obtain only a very limited surface for affording heat; but, to render the small surface it affords as effective as possible, Messrs. Strutt have contrived a most ingenious method of causing the air to be projected in small streams with considerable velocity against the hottest part of the cockle; and, again, that air can only ascend into the air-chamber which has been brought into close contact with the heating surface on the upper part of the cockle.

166. The method of warming by the cockle is rather more limited in application than that by slow conductors; as, in order to get power to move the air through with sufficient velocity, the cockle must be at about the depth of twenty feet below the room it is intended to warm.

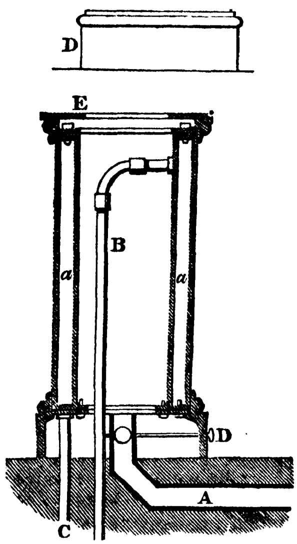
167. The value of steam, as a vehicle for distributing heat, consists in the facility with which it can be conveyed from one fire to any part of the buildings to be warmed,—in the temperature of the surface affording heat never exceeding that degree which is injurious to the air,—and in the perfect safety from fire. Low pressure steam should always be employed for distributing heat; for, when the just proportion of heating surface is prepared, the increased temperature of high pressure steam is not wanted; and it may be proved that there is no economy in using it, while it must be dangerous in proportion to the pressure it is worked at; for it cannot be expected that an experienced engineer will be employed in attending the boiler of an apparatus for warming a building. But employing a simple apparatus, and low pressure steam, with a species of safety-valve inaccessible to the attendant of the fire, and yet not likely to be out of order, will render a steam apparatus perfectly safe, and capable of producing the greatest effect from a given quantity of fuel.

168. The boiler for producing steam is usually constructed in the same manner as a steam-engine boiler, and of the same proportions. It should contain as much steam as will fill all the pipes, or other vessels for affording heat, besides about an equal space for water. From the boiler the steam flows into pipes, which convey it to the places where heat is required, and where it flows into larger pipes, or into other appropriate vessels for affording surface to give out heat. From these pipes, or vessels, the condensed water is returned to the boiler, provided the pipes or vessels be situate above the level of the water in the boiler; but, if this should not be the case, the condensed water is allowed to run off by an inverted syphon, where a column of about nine feet of water is opposed to the force of the steam. Sometimes the same thing is effected by an apparatus termed a steam-trap, which acts by means of a hollow ball, similar to a ball-cock. And, in both these methods, it is necessary to have a small outlet, for clearing the pipes of air when the steam is let in. The valve by which the air is let out, and admitted at, when the pipes are clear of steam, is often made self-acting; the motion being produced by the expansion and contraction of the pipes. When the pipes are cool, the valve is open; but when they become heated, by the steam being admitted, they expand in length, and close the valve.

169. In some cases the condensed water may be let off by a common cock; which, when the apparatus is at work, should be only opened just so as to let the condensed water escape. For hot-houses this answers very well, and requires very little more attention than the other modes. The conveying pipe should ascend as nearly in a vertical direction as possible from the boiler, and then descend to the vessels for containing steam to afford heat; by this arrangement, the steam is not interrupted by the return of condensed water down the pipe. It must be obvious that the condensed water should be let out at the lowest part of the pipes or vessels; but it is not equally obvious that the air in the pipes should be let out at the same place; and, from a want of attention to this circumstance, there has sometimes been a difficulty in expelling the air from the pipes. Common air is, however, heavier than steam, and should be let out at the lowest part of the pipes.

170. The heating surface may be obtained in various ways. For ordinary circumstances common flange pipes, of from three to five inches interior diameter, and cast as thin as they can be cast, sound and perfect. Double cylinders, one of which is shown in the first figure, and its section beneath, may, in other cases, be used with advantage, as they afford a large quantity of surface; and, by introducing a pipe A, for fresh air, into the central part of the cylinder, it warms the air as it enters the room.

171. The top and the base fit on to the cy-



linder, and it is supplied with steam from the wrought iron-pipe B, and the air and condensed water are taken away by the pipe C. The admission of fresh air is to be regulated by the handle D. The steam occupies the space between the two cylinders at *a*, *a*, in the section. It is necessary that the cylinder should have an open top, as shown at E; and, as the height should not exceed about three feet, it is requisite to make the open work ornamental.

172. In other instances, I have used pipes joined in short lengths, nearly in the form of a distiller's worm, and placed an open trellis screen over them.

173. The proportion of pipe required to heat a given quantity of air per minute is easily calculated, by the following formula:—

$\frac{\cdot 48\, C\, (T - t)}{200 - T}$ = the superficial content of surface of steam vessel that will heat C cubic feet of air, from the temperature t to T, in one minute. Therefore, the quantity of ventilation and loss of heat per minute, being ascertained by the principles already given for ventilation, it is easy to provide the requisite supply of heat. It is assumed that the pipes are of cast iron, that being the fittest material, except for the small conveying pipe, which may be of wrought iron; but other surfaces will afford about the same quantity of heat, if of a dark color, and the surface a little rough and spongy: a bronze color is very well adapted for the giving of heat.

174. In applying steam-heat, it should always be made to warm that part of the air which is introduced for ventilation, before it enters the rooms; but it should only be warmed to a temperature a little lower than the mean temperature of the room; the proportion of pipe to be applied for that purpose our formula will show, and a register to regulate the quantity which enters, will put it in the power of any person to alter it at pleasure.

175. When steam-heat is employed in a dwelling-house, the distilled water is found useful for many domestic purposes; and, as the saving of fuel, by returning it to the boiler, is much less than it is imagined to be, not exceeding one-twelfth of the whole expenditure, the convenience of having this kind of water will be a sufficient compensation. For further information on this important subject, see Tredgold on Heating and Ventilating Buildings.

176. In the preceding account of the motion of air in conexion with ventilation we have but examined the tendency to a state of pneumatic equilibrium which is continually taking place on the large scale over every part of the terraqueous globe. It is by the aid of the winds that the earth's surface is ventilated, and the atmosphere fitted for respiration. If our globe were at rest, and the sun were always acting over the same part, the earth and air directly under it would become exceedingly heated, and the air would be constantly rising like oil in water, or like the smoke from a great fire; while there would be currents or winds in all directions below, towards the central spot. But the earth is constantly whirling under the sun, so that the whole middle region or equatorial belt may be called the sun's place; and therefore, according to the principle just laid down, there should be a constant rising of air over it, and constant currents from the two sides of it, or the north and south, to supply the ascent. Now this phenomenon is really going on, and has been going on since the beginning of the world, producing the steady winds of the northern and southern hemispheres, called trade winds, on which, on most places within thirty degrees of the equator, mariners reckon almost as confidently as on the rising of the sun himself.

177. According to the laws of statics, the air, which is less rarefied or expanded by heat, and consequently is more ponderous, must have a motion towards those parts of it which are more rarefied, and less ponderous, to bring it to an equilibrium; also, the presence of the sun continually shifting to the westward, that part towards which the air tends, by reason of the rarefaction made by his greatest meridian heat, is, with him, carried westward; and consequently the tendency of the whole body of the lower air is that way.

178. Thus a general easterly wind is formed, which being impressed upon the air of a vast ocean, the parts impel one the other, and so keep moving till the next return of the sun, by which so much of the motion as was lost is again restored; and thus the easterly wind is made perpetual.

179. From the same principle it follows that this easterly wind should, on the north side of the equator, be to the northward of the east, and in south latitudes to the southward of it; for,

near the line, the air is much more rarefied than at a greater distance from it; because the sun is twice in a year vertical there, and at no time distant above 23½°; at which distance, the heat, being as the sine of the angle of incidence, is but little short of that of the perpendicular ray; whereas under the tropics, though the sun stay longer vertical, yet he is a long time 47° off, which is a kind of winter, in which the air so cools as that the summer heat cannot warm it to the same degree with that under the equator. Wherefore, the air towards the north and south being less rarefied than that in the middle, it follows, that from both sides it ought to tend towards the equator.

180. This motion, compounded with the former easterly wind, accounts for all the phenomena of the general trade-winds, which, if the whole surface of the globe was sea, would undoubtedly blow quite round the world, as they are found to do in the Atlantic and the Ethiopic oceans. But seeing that so great continents do interpose, and break the continuity of the ocean, regard must be had to the nature of the soil, and the position of the high mountains, which are the two principal causes of the variations of the wind from the former general rule; for if a country lying near the sun prove to be flat, sandy, and low land, such as the deserts of Libya are usually reported to be, the heat occasioned by the reflexion of the sun's beams, and the retention of it in the sand, is incredible to those who have not felt it; by which the air being exceedingly rarefied, it is necessary that the cooler and more dense air should run thitherwards, to restore the equilibrium. This is supposed to be the cause why, near the coast of Guinea, the wind always sets in upon the land, blowing westerly instead of easterly, there being sufficient reason to believe that the inland parts of Africa are prodigiously hot, since the northern borders of it were so very intemperate, as to give the ancients cause to conclude that all beyond the tropics was uninhabitable by excess of heat.

181. Mr. Clare, in his Motion of Fluids, p. 302, mentions a familiar experiment, that serves to illustrate this matter, as well as the alternate course of land and sea breezes. Fill a large dish with cold water, and in the middle of it place a water-plate, filled with warm water: the first will represent the ocean, the other an island, rarefying the air above it. Then holding a wax-candle over the cold water, blow it out, and the smoke will be seen, in a still place, to move toward the warm plate, and, rising over, it will point the course of the air (and also of vapor) from sea to land. And if the ambient water be warmed, and the plate filled with cold water, and the smoking wick of a candle held over the plate, the contrary will happen.

182. From the same cause it happens, that there are so constant calms in that same part of the ocean, called the rains; for this tract being placed in the middle, between the westerly winds blowing on the coast of Guinea, and the easterly trade winds blowing to the westward of it; the tendency of the air here is indifferent to either, and so stands in equilibrio between both; and the weight of the incumbent atmosphere being diminished by the continual contrary winds blowing from hence, is the reason that the air here holds not the copious vapor it receives, but lets it fall in so frequent rains.

183. But, as the cold and dense air, by reason of its greater gravity, presses upon the hot and rarefied, it is demonstrable that this latter must ascend in a continued stream as fast as it rarefies; and that, being ascended, it must disperse itself to preserve the equilibrium; that is, by a contrary current, the upper air must move from those parts where the greatest heat is: so by a kind of circulation, the north-east trade-wind below will be attended with a south-westerly wind above; and the south-east with a north-west wind above.

184. That this is more than a bare conjecture, the almost instantaneous change of the wind to the opposite point, which is frequently found in passing the limits of the trade-winds, seems strongly to assure us; but that which above all confirms this hypothesis is the phenomenon of the monsoons, by this means most easily solved, and without it hardly explicable.

185. Supposing, therefore, such a circulation as above, it is to be considered, that to the northward of the Indian Ocean there is every where land, within the usual limits of the latitude of 30°; viz. Arabia, Persia, India, &c., which, for the same reason as the Mediterranean parts of Africa, are subject to insufferable heats when the sun is to the north, passing nearly vertical; but yet are temperate enough when the sun is removed towards the other tropic, because of a ridge of mountains at some distance within the land, said to be frequently in winter, covered with snow, over which the air, as it passes, must needs be much chilled. Hence it happens that the air coming, according to the general rule, out of the north-east, to the Indian Sea, is sometimes hotter, sometimes colder, than that which, by this circulation, is returned out of the south-west; and, by consequence, sometimes the under current, or wind, is from the north-east, sometimes from the south-west.

186. That this has no other cause is clear from the times in which these winds set, viz. in April; when the sun begins to warm these countries to the north, the south-west monsoons begin, and blow, during the heats, till October, when the sun being retired, and all things growing cooler northward, and the heat increasing to the south, the north-east winds enter, and blow all the winter till April again. And it is, undoubtedly, from the same principle, that to the southward of the equator, in part of the Indian Ocean, the north-west winds succeed the south-east, when the sun draws near the tropic of Capricorn. Philosophical Transactions, No. 183, or Abridgement, vol. ii. p. 139.

187. Some philosophers, dissatisfied with Dr. Halley's theory above recited, or not thinking it sufficient for explaining the various phenomena of the wind, have had recourse to another cause, viz. the gravitation of the earth and its atmosphere towards the sun and moon, to which the tides are confessedly owing.

188. From the laws of universal attraction it has been inferred that these celestial bodies must act upon the atmosphere, or that they must occasion a flux and reflux of the atmosphere, as well as of the ocean. Hence it has been alleged, that though we cannot discover aërial tides, of ebb or flow, by means of the barometer, because columns of air of unequal height, but different density, may have the same pressure or weight; yet the protuberance in the atmosphere, which is continually following the moon, must, they say, of course produce a motion in all parts, and so produce a wind more or less to every place, which, conspiring with or counteracted by the winds arising from other causes, makes them greater or less. Several dissertations to this purpose were published, on occasion of the subject proposed by the Academy of Sciences at Berlin, for the year 1746.

189. Although the atmospherical air is much more variable than water, and the action of the sun and moon upon it becomes much less apparent to us, because they must frequently concur with or be counteracted by the much more powerful effects of heat and cold, of dryness and moisture, of winds, &c., so that their action upon the barometer has been long disputed and even denied, yet, that the moon in particular, as well as the sun, has such an action has been for a considerable time surmised; and of late years it has been in a degree observed and rendered sensible by means of very accurate and long-continued barometrical observations, and perceived only by taking a mean of the observations of many years.

190. Toaldo, the learned astronomer of Padua, after a variety of observations made in the course of several years, found reason to assert that, ceteris paribus, at the time of the moon's apogeum, the mercury in the barometer rises the 0·105 of an inch higher than at the perigeum; that at the time of the quadratures the mercury stands 0·008 of an inch higher than at the time of the syzygies; and that it stands 0·022 of an inch higher when the moon in each lunation comes nearest to our zenith (meaning the zenith of Padua, where the observations were made), than when it goes farthest from it. Journal des Sciences Utiles.

191. In the seventh volume of the Philosophical Magazine there is a paper of L. Howard, esq., which contains several curious observations relative to this subject. This gentleman found, both from his own observations, and from an examination of the Meteorological Journal of the Royal Society, which is published annually in the Philosophical Transactions, that the moon had a manifest action upon the barometer. 'It appears,' he says, 'to me evident, that the atmosphere is subject to a periodical change of gravity, by which the barometer, on a mean of ten years, is depressed at least one-tenth of an inch while the moon is passing from the quarters to the full and new; and elevated, in the same proportion, during the return to the quarter.' A great fall of the barometer generally takes place before high tides, especially at the time of new or full moon.

192. The causes, it is said, which render the diurnal tide of the atmosphere insensible to us, may be the elasticity of the air, and the interference of the much more powerful effects of heat, cold, vapors, &c.

193. It has been calculated by D'Alembert, from the general theory of gravitation, that the influence of the sun and moon in their daily motions is sufficient to produce a continual east wind about the equator. So that, upon the whole, we may reckon three principal daily tides, viz. two arising from the attractions of the sun and moon, and the third from the heat of the sun alone: all which sometimes combine together, and form a prodigious tide.

194. In corroboration of the opinion of the influence of the sun, and principally of the moon, in the production of wind, we must likewise mention the observations of Bacon, Gassendi, Dampier, Halley, &c.; namely, that the periods of the year most likely to have high winds are the two equinoxes; that storms are more frequent at the time of new and full moon, especially those new and full moons which happen about the equinoxes; that, at periods otherwise calm, a small breeze takes place at the time of high water; and that a small movement in the atmosphere is generally perceived a short time after the noon and the midnight of each day.

195. M. Muschenbroeck, however, will not allow that the attraction of the moon is the cause of the general wind; because the east wind does not follow the motion of the moon about the earth; for in that case there would be more than twenty-four changes, to which it would be subject in the course of a year instead of two. Introd. ad. Phil. Nat. vol. ii. p. 1102.

196. Some action in the production of wind may also be derived from volcanoes, fermentations, evaporations, and especially from the condensation of vapors; for we find that, in rainy weather, a considerable wind frequently precedes the approach of every single cloud, and that the wind subsides as soon as the cloud has passed over our zenith.

197. Wherever any of the above-mentioned causes are constantly more predominant, as the heat of the sun within the tropics, there a certain direction of the wind is more constant; and where different causes interfere at different and irregular periods, as in those places which are considerably distant from the torrid zone, there the winds are more changeable and uncertain.

198. In short, whatever disturbs the equilibrium of the atmosphere, viz. the equal density or quantity of air at equal distances from the surface of the earth; whatever accumulates the air in one place, and diminishes it in other places, must occasion a wind both in disturbing and in restoring that equilibrium, as above stated.

199. Mr. Henry Eeles, apprehending that the sun's rarefying of the air cannot simply be the cause of all the regular and irregular motions which we find in the atmosphere, ascribes them to another cause, viz. the ascent and descent of vapor and exhalation, attended by the electrical fire or fluid; and on this principle he has endeavoured to explain at large the general phenomena of the weather and barometer. Philosophical Transactions, vol. xlix. art. 25, p. 124.

200. M. Brisson (Principes de Physique) also is of opinion that electricity is the principal and more general cause which produces winds; but Mr. Cavallo is of a different opinion.

201. After making various observations on the nature and theory of winds, Dr. Darwin recapitulates his opinions in the following matter. 1. The north-east wind consists of air flowing from the north, where it seems to be occasionally produced; and has an apparent direction from the east, owing to its not having acquired in its journey the increasing velocity of the earth's surface. These winds are analogous to the trade-winds between the tropics, and frequently continue in the vernal months for four or six weeks together, with a high barometer, and fair and frosty weather. They sometimes consist of south-west air, which had passed by us or over us, driven back by a new accumulation of air in the north; and they continue but a day or two, and are attended with rain.

2. The south-west wind consists of air flowing from the south, and seems occasionally absorbed at its arrival to the more northern latitudes. It has a real direction from the west, owing to its not having lost in its journey the greater velocity it had acquired from the earth's surface from whence it came. These winds are analogous to the monsoon, between the tropics, and frequently continue for four or six weeks together, with a low barometer, and rainy weather. They sometimes consist of north-east air, which had passed by us, and which becomes retrograde by a commencing deficiency of air in the north. These winds continue but a day or two, attended with severe frost, with a sinking barometer; their cold being increased by their expansion as they return into an incipient vacancy.

3. The north-west wind consists first of south-west winds which have been passed over, been bent down, and driven back towards the south by newly generated northern air. They continue but a day or two, and are attended with rain or clouds. They consist of north-east winds bent down from the higher parts of the atmosphere, and having there acquired a greater velocity from the earth's surface are frosty and fair. They consist of north-east winds formed into a vertical eddy, not a spiral one, with frost or fair.

4. The north winds consist first of air flowing slowly from the north, so that they acquire the velocity of the earth's surface as they approach it; they are fair or frosty, but seldom occur. They consist of retrograde south winds; these continue but a day or two, are preceded by south-west winds, and are generally succeeded by north-east winds, cloudy or rainy weather, the barometer rising.

5. The south winds consist first of air slowly flowing from the south, losing their previous westerly velocity by the friction of the earth's surface as they approach it; they are moist, but seldom occur. They consist of retrograde north winds; these continue but a day or two, and are preceded by north-east winds, and are generally succeeded by south-west winds, colder, and the barometer sinking.

6. The east winds consist of air brought hastily from the north, and not impelled farther southward, owing to a sudden beginning absorption of air in the northern regions; they are very cold, the barometer high, and are generally succeeded by south-west winds.

7. The west winds consist of air brought hastily from the south, and checked from proceeding farther to the north, by a beginning production of air in the northern regions; they are warm and moist, and generally succeeded by north-east winds. They consist of air bent downwards from the higher regions of the atmosphere; if this air be from the south, and brought hastily, it becomes a wind of great velocity, moving perhaps sixty miles in an hour, and is warm and rainy; if it consists of northern air bent down it is of less velocity, and cooler.

202. Various other interesting remarks and reflections on winds may be seen in the notes to the Botanic Garden, by the same writer.

203. The industry of some late writers having brought the theory of the production and motion of winds to somewhat of a mathematical demonstration, we shall here give it the reader in that form :—

204. If the spring of the air be weakened in any place, more than in the adjoining places, a wind will blow through the place where the diminution is.

For, 1. Since the air endeavours, by its elastic force, to expand itself every way; if that force be less in one place than another, the effort of the more against the less elastic will be greater than the effort of the latter against the former. The less elastic air, therefore, will resist with less force than it is urged by the more elastic: consequently the less elastic will be driven out of its place, and the more elastic will succeed. If, now, the excess of the spring of the more elastic above that of the less elastic air, be such as to occasion a little alteration in the baroscope; the motion both of the air expelled, and that which succeeds it, will become sensible, i. e. there will be a wind.

2. Hence, since the spring of the air increases as the compressing weight increases, and compressed air is denser than air less compressed, all winds blow into rarer air out of a place filled with a denser.

3. Wherefore, since a denser air is specifically heavier than a rarer, an extraordinary lightness of the air in any place must be attended with extraordinary winds or storms. Now, an extraordinary fall of the mercury in the barometer showing an extraordinary lightness in the atmosphere, it is no wonder if that foretels storms. See BAROMETER.

4. If the air be suddenly condensed in any place, its spring will be suddenly diminished: hence, if this diminution be great enough to affect the barometer, there will a wind blow through the condensed air.

5. But since the air cannot be suddenly condensed, unless it have before been much rarefied, there will a wind blow through the air, as it cools, after having been violently heated.

6. In like manner, if air be suddenly rarefied, its spring is suddenly increased: wherefore, it

will flow through the contiguous air, not acted on by the rarefying force. A wind, therefore, will blow out of a place in which the air is suddenly rarefied; and on this principle, in all probability, it is, that,

7. Since the sun's power in rarefying the air is notorious, it must necessarily have a great influence on the generation of winds.

8. Most caves are found to emit wind, either more or less. M. Muschenbroeck has enumerated a variety of causes that produce winds, existing in the bowels of the earth, on its surface, in the atmosphere, and above it. See Intr. ad Phil. Nat. vol. ii. p. 1116, &c.

205. The rising and changing of the wind are determined experimentally, by means of weather-cocks, placed on the tops of houses, &c. But these only indicate what passes about their own height, or near the surface of the earth: Wolfius assures us, from observations of several years, that the higher winds, which drive the clouds, are different from the lower ones, which move the weather-cocks. And Dr. Derham observes something not unlike this. Phys. Theol. lib. i cap. 2.

206. The author last mentioned relates, upon comparing several series of observations made of the winds in divers countries, viz. England, Ireland, Switzerland, Italy, France, New England, &c., that the winds in those several places seldom agree; but when they do it is commonly when they are strong, and of long continuance in the same quarter; and more, he thinks, in the northerly and easterly than in other points. Also, that a strong wind in one place is oftentimes a weak one in another, or moderate, according as the places are nearer, or more remote. Phil. Trans. No. 267 and 321.

207. Wind being only air in motion, and air being a fluid subject to the laws of other fluids, its force may be regularly brought to a precise computation: thus, 'The ratio of the specific gravity of any other fluid to that of air, together with the space that fluid, impelled by the pressure of the air, moves in any given time, being given; we can determine the space through which the air itself, acted on by the same force, will move in the same time.' By this rule:—

1. As the specific gravity of air is to that of any other fluid; so, reciprocally, is the square of the space which that fluid, impelled by any force, moves in any given time, to the square of the space which the air, by the same impulse, will move in the same time. Supposing, therefore, the ratio of the specific gravity of that other fluid to that of air, to be $= \frac{b}{c}$; the space described by the fluid to be called s; and that which the air will describe by the same impulse x. The rule gives us $x = \sqrt{\frac{b\,s^2}{c}}$. Hence, if we suppose water impelled by the given force to move two feet in a second of time, then will $s = 2$; and, since the specific gravity of water to the air is as 800 to 1, we shall have $b = 800$, and $c = 1$; consequently, $x = \sqrt{800 + 4} = \sqrt{3200} = 57$ feet nearly. The velocity of the wind, therefore, to that of water moved by the same power, will be as 57 to 2; i. e. if water move two feet in a second, the wind will fly 57 feet.

2. Add, that $s = \sqrt{\frac{c\,x^2}{b}}$; and therefore the space any fluid, impelled by any impression, moves in any time, is determined by finding a fourth proportional to the two numbers that express the ratio of the specific gravities of the two fluids, and the square of the space the wind moves in, in the given time. The square root of that fourth proportional is the space required, M. Mariotte, e. gr. found, by various experiments, that a pretty strong wind moves 24 feet in a second of time; which is at the rate of 1440 in a minute; i. e. at the rate of somewhat more than 16 miles in an hour: wherefore, if the space which the water, acted on by the same force as the air, will describe in the same time, be required; then will $c = 1$, $x = 24$, $b = 800$; and we shall find $s = \sqrt{\frac{576}{800}} = \frac{84}{100}$ nearly. Derham estimated the velocity of the wind in very great storms at 66 feet per second; and de la Condamine at 90 $\frac{1}{2}$ feet per second.

3. 'The velocity of wind being given, to determine the pressure required to produce that velocity;' we have this rule. The space the wind moves in one second of time is to the height a fluid is to be raised in an empty tube, in order to have a pressure capable of producing that velocity, in a ratio compounded of the specific gravity of the fluid to that of the air, and of quadruple the altitude a body descends in the first second of time, to the aforesaid space of the air.

208. Suppose, e. gr., the space through which the air moves in a second, $a = 24$ feet, or 288 inches; call the altitude of the fluid x; and the ratio of mercury to air $\frac{b}{c} = \frac{800 \times 14}{1} = \frac{11200}{1}$; and the altitude through which a body descends in the first second of time, 16 feet 1 inch; then, by the theorem, we shall have $288 : x :: 11200 \times 762 : 288$, and consequently $x = \frac{288 \times 288}{11200 \times 762} = \cdot 01$, &c., of an inch. Hence we see why a small but sudden change in the barometer is followed with violent winds. See an account of the principle upon which these calculations are founded under the article WATER.

209. When the direction of the wind is not perpendicular, but oblique to the surface of the solid, then the force of the former upon the latter will not be so great as when the impulse is direct, and that for reasons which are easily derived from the theory of the resolution and composition of forces, and from the theory of direct and oblique impulses. In short, the general proposition for compound impulses is, that the effective impulse is as the surface, as the square of the air's velocity, as the square of the sine of the angle of incidence, and as the sine of the obliquity of the solid's motion to the direction of the impulse, jointly; for the alteration of every one of these quantities will alter the effect in the same proportion. But these general rules, as we have already more than once observed, are

subject to great variations; so that their results seldom coincide with those of actual experiments.

210. Philosophers have used various methods for determining the velocity of the wind, which is very different at different times. The method used by Dr. Derham was that of letting light downy feathers fly in the wind, and accurately observing the distance to which they were carried in any number of half seconds. This method he preferred to that of Dr. Hooke's mola alata, or pneumatica. (See Phil. Trans. No. 24, and Birch's Hist. Roy. Soc. vol. iv. p. 225.) He tells us that he thus measured the velocity of the wind in the great storm of August, 1705, and by many experiments found that it moved at the rate of thirty-three feet per half second, or of forty-five miles per hour: whence he concludes that the most vehement wind (as that of November, 1703) does not fly at the rate of above fifty or sixty miles per hour. Phil. Trans. No. 313, or Abr. vol. iv. p. 411.

211. Mr. Brice observes that experiments with feathers are subject to uncertainty: as they seldom or ever describe a straight line, but describe a sort of spirals, moving to the right and left, and rising to very different altitudes in their progress. He, therefore, considers the motion of a cloud, or its shadow, over the surface of the earth, as a much more accurate measure of the velocity of the wind. In this way he found that the wind, in a considerable storm, moved at the rate of 62·9 miles per hour; and that, when it blew a fresh gale, it moved in the same time about twenty-one miles; and that in a small breeze the wind moved at the rate of 9·9 miles per hour. Phil. Trans. vol. lvi. p. 226.

212. But it has been observed by Cavallo and others, that this method is very fallacious, partly because it is not known whether the clouds do or do not move exactly with the air in which they float; and partly because the velocity of the air in the region where the clouds float is by no means the same with that of the air which is nearer to the surface of the earth, and is sometimes quite contrary to it, as indicated by the motion of the clouds themselves. Others have estimated the velocity of the wind by the changes effected by it upon the motion of sound, which must of course be very inacurate. A very simple method of determining the velocity of the wind is that which M. Coulomb (Mem. de l' Acad. Roy. 1781, p. 70) employed in his experiments on wind-mills, because it requires neither the aid of instruments nor the trouble of calculation. Two persons were placed on a small elevation, at the distance of 150 feet from one another, in the direction of the wind; and, while the one observed, the other measured the time which a small and light feather employed in removing through this space. The distance between the two persons, divided by the number of seconds, gave the velocity of the wind per second. The best method, says Cavallo, of measuring the velocity of the wind, is by observing the velocity of the smoke of a low chimney, or by estimating the effect it produces upon certain bodies, and thus may be determined its force as well as its velocity. We shall here observe that from the concurrence of experiments made with various instruments, and different modes of calculation, it has been inferred, that in currents of air, of the denominations which are expressed in the fourth column of the annexed table, the air moves at the rate of so many feet per second as are expressed in the second column, or of so many miles per hour as are expressed in the first column.

213. A TABLE of the different velocities and forces of the winds, constructed by Mr. Rouse with great care, from a considerable number of facts and experiments, and communicated to Mr. Smeaton, and first published by him in the fifty-first volume of the Philosophical Transactions.

Velocity of the Wind. Miles in one hour.	Velocity of the Wind. = Feet in one second.	Perpendicular force on 1 sq. ft. in avoirdupois pounds.	Common appellations of the forces of winds.
1	1·47	·005	Hardly perceptible.
2	2·93	·020	Just perceptible.
3	4·40	·044	
4	5·87	·079	Gentle pleasant wind.
5	7·33	·123	
10	14·67	·492	Pleasant brisk gale.
15	22·00	1·107	
20	29·34	1·968	Very brisk.
25	36·67	3·075	
30	44·01	4·429	High wind.
35	51·34	6·027	
40	58·68	7·873	Very high.
45	66·01	9·963	
50	75·35	12·300	A storm or tempest.
60	88·02	17·715	A great storm.
80	117·36	31·490	A hurricane.
100	146·70	19·200	A hurricane that tears up trees, and carries buildings, &c., before it.

214. The force of the wind is as the square of its velocity, as Mr. Ferguson has shown by experiments on the whirling-table; and in moderate velocities this will hold very nearly. Upon this principle the numbers in the third column are calculated. The proposition upon which this column has been formed seems to be, that the impulse of a current of air, striking perpendicularly upon a given surface, with a certain velocity, is equal to the weight of a column of air which has that surface for its base, and for its height the space through which a body must fall, in order to acquire that velocity of the air.

215. It is observed, with regard to this table, that the evidence for those numbers, where the velocity of the wind exceeds fifty miles an hour, does not seem of equal authority with that of those of fifty miles, or under. Phil. Trans. vol. li. p. 165.

216. As the winds of the torrid zone differ in several important particulars from those which

blow without the tropics, we shall first describe them, and afterwards those of the temperate zones.

217. I. In those parts of the Atlantic and Pacific oceans which lie nearest the equator, there is a regular wind during the whole year called the trade-wind. On the north side of the equator it blows from the north-east, varying frequently a point or two towards the north or east; and on the south side of it, from the south-east, changing sometimes in the same manner towards the south or east. The space included between 2° and 5° of N. lat. is the internal limit of these two winds. There the winds can neither be said to blow from the north nor the south; calms are frequent, and violent storms. This space varies a little in latitude as the sun approaches either of the tropics.—In the Atlantic Ocean the trade winds extend farther north on the American than on the African coast; and, as we advance westward, they become gradually more easterly, and decrease in strength. Their force diminishes likewise as we approach their utmost boundaries. It has been remarked, also, that, as the sun approaches the tropic of Cancer, the south-east winds become gradually more southerly, and the north-east winds more easterly: exactly the contrary takes place when the sun is approaching the tropic of Capricorn.

218. The trade wind blows constantly in the Indian Ocean from 10° of S. lat. to near 30°: but to the northward of this the winds change every six months, and blow directly opposite to their former course. These regular winds are called monsoons, from the Malay word moossin, which signifies 'a season.' When they shift their direction, variable winds and violent storms succeed, which last for a month and frequently longer; and during that time it is dangerous for vessels to continue at sea.

219. The monsoons in the Indian Ocean may be reduced to two; one on the north and another on the south side of the equator; which extend from Africa to the longitude of New Holland and the east coast of China, and which suffer partial changes in particular places from the situation and inflection of the neighbouring countries.

1. Between 3° and 10° of S. lat. the south-east trade-wind continues from April to October; but during the rest of the year the wind blows from the north-west. Between Sumatra and New Holland this monsoon blows from the south during our summer months, approaching gradually to the south-east as we advance towards the coast of New Holland; it changes about the end of September, and continues in the opposite direction till April. Between Africa and Madagascar its direction is influenced by the coast; for it blows from the north-east from October to April, and during the rest of the year from the south-west.

2. Over all the Indian Ocean, to the northward of 3° S. lat., the north-east trade-wind blows from October to April, and a south-west wind from April to October. From Borneo, along the coast of Malacca and as far as China, this monsoon in summer blows nearly from the south, and in winter from the north by east. Near the coast of Africa, between Mozambique and Cape Guardafeu, the winds are irregular during the whole year, owing to the different monsoons which surround the particular place.—Monsoons are likewise regular in the Red Sea; between April and October they blow from the north-west, and during the other months from the south-east, keeping constantly parallel to the coast of Arabia.

220. Monsoons are not altogether confined to the Indian Ocean; on the coast of Brasil, between Cape St. Augustine and the island of St. Catherine, the wind blows between September and April from the east or north-east, and between April and September from the south-west.—The bay of Panama is the only place on the west side of a great continent where the wind shifts regularly at different seasons: there it is easterly between September and March; but between March and September it blows chiefly from the south and south-west.

221. Such in general is the direction of the winds in the torrid zone all over the Atlantic, Pacific, and Indian Oceans, but they are subject to particular exceptions, which we shall now endeavour to enumerate.—On the coast of Africa, from Cape Bayador to Cape Verde, the winds are generally north-west; from hence to the island of St. Thomas near the equator they blow almost perpendicular to the shore, bending gradually, as we advance southwards, first to the west and then to the south-west. On the coast of New Spain likewise, from California to the Bay of Panama, the winds blow almost constantly from the west or south-west, except during May, June, and July, when land winds prevail, called by the Spaniards popogayos. On the coast of Chili and Peru, from 20° to 30° S. lat. to the equator, and on the parallel coast of Africa, the wind blows during the whole year from the south, varying according to the direction of the land towards which it inclines, and extending much farther out to sea on the American than the African coast. The trade winds are also interrupted sometimes by westerly winds in the Bay of Campeachy and the Bay of Honduras.

222. As to the countries between the tropics, we are too little acquainted with them to be able to give a satisfactory history of their winds.

In all maritime countries between the tropics of any extent, the wind blows during a certain number of hours every day from the sea, and during a certain number towards the sea from the land; these winds are called the sea and land breezes. The sea breeze generally sets in about ten in the forenoon, and blows till six in the evening; at seven the land-breeze begins, and continues till eight in the morning, when it dies away. During summer the sea-breeze is very perceptible on all the coasts of the Mediterranean Sea, and even sometimes as far north as Norway.

223. In the island of St. Lewis on the coast of Africa, in 16° N. lat., and 16° W. long., the wind during the rainy season, which lasts from the middle of July to the middle of October, is generally between the south and east; during the rest of the year it is for the most pert east or north-east in the morning; but, as the sun rises, the wind approaches gradually to the north, till

about noon it gets to the west of north, and is called a sea-breeze. Sometimes it shifts to the east as the sun descends, and continues there during the whole night. In February, March, April, May, and June, it blows almost constantly between the north and west. In the island of Balama, which lies likewise on the west coast of Africa, in 11° N. lat., the wind during nine months of the year blows from the south-west; but in November and December a very cold wind blows from the north-east.

224. In the kingdom of Bornou, which lies between 16° and 20° N. lat., the warm season is introduced about the middle of April by sultry winds from the south-east, which bring along with them a deluge of rain. In Fezzan, which is situated about 25° N. lat., and 35° E. long., the wind from May to August blows from the east, south-east, or south-west, and is intensely hot.

225. In Abyssinia the winds generally blow from the west, north-west, north, and north-east. During the months of June, July, August, Septemper, and October, the north and north-east winds blow almost constantly, especially in the morning and evening; and during the rest of the year they are much more frequent than any other winds.

226. At Calcutta, in the province of Bengal, the wind blows during January and February from the south-west and south; in March, April, and May, from the south; in June, July, August, and September, from the south and south-east; in October, November, and December, from the north-west.—At Madras the most frequent winds are the north and north-east.—At Tivoli in St. Domingo, and the Isles de Vaches, the wind blows oftenest from the south and south-east.—From these facts it appears, that in most tropical countries with which we are acquainted the wind generally blows from the nearest ocean, except during the coldest months, when it blows towards it.

227. II. In the temperate zones the direction of the winds is by no means so regular as between the tropics. Even in the same degree of latitude, we find them often blowing in different directions at the same time; while their changes are frequently so sudden and so capricious that to account for them has hitherto been found impossible. When winds are violent, and continue long, they generally extend over a large tract of country; and this is more certainly the case when they blow from the north or east, than from any other points. By the multiplication and comparison of Meteorological Tables, some regular connexion between the changes of the atmosphere in different places may in time be observed, which will at last lead to a satisfactory theory of the winds. It is from such tables chiefly that the following facts have been collected.

228. In Virginia, the prevailing winds are between the south-west, west, north, and north-west; the most frequent is the south-west, which blows more constantly in June, July, and August, than at any other season. The north-west winds blow most constantly in November, December, January, and February.—At Ipswich, in New England, the prevailing winds are also between the south-west, west, north, and north-east; the most frequent is the north-west. But at Cambridge, in the same province, the most frequent wind is the south-east.—The predominant winds at New York are the north and west. And in Nova Scotia north-west winds blow for three-fourths of the year.—The same wind blows most frequently at Montreal in Canada; but at Quebec the wind generally follows the direction of the river St. Lawrence, blowing either from the north-east or south-west.—At Hudson's Bay westerly winds blow for three-fourths of the year; the north-west wind occasions the greatest cold, but the north and north-east are the vehicles of snow.

229. It appears, from these facts, that west winds are most frequent over the whole eastern coast of North America; that in the southern provinces south-west winds predominate; and that the north-west become gradually more frequent as we approach the frigid zone.

230. In Egypt, during part of May, and during June, July, August, and September, the wind blows almost constantly from the north, varying sometimes in June to the west, and in July to the west and the east: during part of September, and in October and November, the winds are variable, but blow more regularly from the east than any other quarter; in December, January, and February, they blow from the north, north-west, and west; towards the end of February they change to the south, in which quarter they continue till near the end of March; during the last days of March, and in April, they blow from the south-east, south, and south-west, and at last from the east; and in this direction they continue during a part of May.

231. In the Mediterranean the wind blows nearly three-fourths of the year from the north; about the equinoxes there is always an east wind in that sea, which is generally more constant in spring than in autumn. These observation do not apply to the gut of Gibraltar, where there are seldom any winds except the east and west.—At Bastia, in the island of Corsica, the prevailing wind is the south-west.

233. In Syria the north wind blows from the autumnal equinox to November; during December, January, and February, the winds blow from the west and south-west; in March they blow from south; in May from the east; and in June from the north. From this month to the autumnal equinox the wind changes gradually as the sun approaches the equator; first to the east, then to the south, and lastly to the west. At Bagdad the most frequent winds are the south-west and north-west; at Pekin the north and the south; at Kamtschatka, on the north-east coast of Asia, the prevailing winds blow from the west.

233. In Italy the prevailing winds differ considerably according to the situation of the places where the observations have been made: at Rome and Padua they are northerly; at Milan easterly. All that we have been able to learn concerning Spain and Portugal is, that on the west coast of these countries the west is by far the most common wind, particularly in summer; and that at Madrid the wind is north-east for the greatest part of the summer, blowing almost constantly from the Pyrenean Mountains.—At Berne in

Switzerland the prevailing winds are the north and west; at St. Gothard the north-east; at Lausanne the north-west and south-west.

234. Father Cotte has given us the result of observations made at eighty-six different places of France; from which it appears that along the whole south coast of that kingdom the wind blows most frequently from the north, north-west, and north-east; on the west coast from the west, south-west, and north-west; and on the north coast from the south-west. That in the interior parts of France the south-west wind blows most frequently in eighteen places; the west wind in fourteen; the north in thirteen; the south in six; the north-east in four; the south-east in two; the east and north-west each of them in one. On the west coast of the Netherlands, as far north as Rotterdam, the prevailing winds are probably the south-west, at least this is the case at Dunkirk and Rotterdam. It is probable also that along the rest of this coast, from the Hague to Hamburgh, the prevailing winds are the north-west, at least these winds are most frequent at the Hague and at Franeker. The prevailing wind at Delft is the south-east, and at Breda the north and the east.

235. In Germany the east wind is most frequent at Gottingen, Munich, Weissemburg, Dusseldorf, Saganum, Erford, and at Buda in Hungary; the south-east at Prague and Wirtzberg; the north-east at Ratisbon; and the west at Manheim and Berlin.

236. From an average of ten years of the register kept by order of the Royal Society, it appears, that at London the wind blows in the following order:—

Winds.	Days.	Winds.	Days.
South-west . .	112	South-east . . .	32
North-east . .	58	East	26
North-west . .	50	South	18
West	53	North	16

237. It appears, from the same register, that the south-west wind blows at an average more frequently than any other wind during every month of the year, and that it blows longest in July and August; that the north-east blows most constantly during January, March, April, May, and June, and most seldom during February, July, September, and December; and that the north-west wind blows often from November to March, and more seldom during September and October, than any other months. The south-west winds are also most frequent at Bristol, and next to them are the north-east.

238. The following table of the winds at Lancaster has been drawn up from a register kept for seven years at that place:—

Winds.	Days.	Winds.	Days.
South-west .	92	South-east . . .	35
North-east .	67	North	30
South . .	51	North-west . . .	26
West . .	41	East	17

239. The following table is an extract of nine years' observations made at Dumfries by Mr. Copland:—

Winds.	Days.	Winds.	Days.
South . .	. 82½	North . .	36½
West . .	. 69	North-west	. 25½
East . .	. 68	South-east	. 18½
South-west	. 50½	North-east	. 14½

240. The following table is an abstract of seven years' observations made by Mr. Meek at Cambuslang near Glasgow:—

Winds.	Days.	Winds.	Days.
South-west . .	174	North-east . . .	104
North-west . .	140	South-east . . .	47

241. It appears, from the register from which this table was extracted, that the north-east wind blows much more frequently in April, May, and June, and the south-west in July, August, and September, than at any other period. We learn from the Statistical Account of Scotland that the south-west is by far the most frequent wind all over that kingdom, especially on the west coast. At Saltcoats in Airshire, for instance, it blows three-fourths of the year; and along the whole coast of Murray, on the north-east side of Scotland, it blows for two-thirds of the year. East winds are common over all Great Britain during April and May; but their influence is felt most severely on the eastern coast.

242. The following table exhibits a view of the number of days during which the westerly and easterly winds blow in a year at different parts of the island. Under the term westerly are included the north-west, west, south-west, and south; the term easterly is taken in the same latitude:—

Years of Observation.	Places.	Wind.	
		Westerly.	Easterly.
10	London	233	132
7	Lancaster	216	149
51	Liverpool	170	175
9	Dumfries	227·5	137·5
10	Branxholm, fifty-four miles south-west of Berwick	232	133
7	Cambuslang . . .	214	151
8	Hawkhill, near Edinburgh	229·5	135·5
	Mean	217·4	144·7

243. In Ireland the south-west and west are the grand trade-winds, blowing most in summer, autumn, and winter, and least in spring. The north-east blows most in spring, and nearly double to what it does in autumn and winter. The south-east and north-east are nearly equal, and are most frequent after the south-west and west.

244. At Copenhagen the prevailing winds are the east and south-east; at Stockholm the west and north. In Russia, from an average of a register of sixteen years, the winds blow from November to April in the following order:—

	West.	N. W.	East.	S. W.	South.	N. E.	N.	S. E.
Days	45	26	23	22	20	19	14	12

And during the other six months,

	West.	N. W.	East.	S. W.	South.	N. E.	N.	S. E.
Days	27	27	19	24	22	15	32	18

245. The west wind blows during the whole year seventy-two days; the north-west fifty-three; the south-west and north forty-six days each. During summer it is calm for forty-one days, and during winter for twenty-one. In Norway the most frequent winds are the south, the south-west, and south-east. The wind at Bergen is seldom directly west, but generally south-west or south-east; a north-west, and especially a north-east wind, are but little known there.

246. From the whole of these facts, it appears that the most frequent winds on the south coasts of Europe are the north, the north-east, and north-west; and, on the western-coast, the south-west: that in the interior parts which lie most contiguous to the Atlantic Ocean, south-west winds are also most frequent; but that easterly winds prevail in Germany. Westerly winds are also most frequent on the north-east coast of Asia.

247. It is probable that the winds are more constant in the south temperate zone, which is in a great measure covered with water, than in the north temperate zone, where their direction must be frequently interrupted and altered by mountains and other causes.

248. M. de la Bailie, who was sent thither by the French king to make astronomical observations, informs us that at the Cape of Good Hope the main winds are the south-east and north-west; that other winds seldom last longer than a few hours; and that the east and north-east winds blow very seldom. The south-east wind blows in most months of the year, but chiefly from October to April; the north-west prevails during the other six months, bringing along with it rain, and tempests, and hurricanes. Between the Cape of Good Hope and New Holland the winds are commonly westerly, and blow in the following order: north-west, south-west, west north.

249. In the great South Sea, from lat. 30° to 40° S. the south-east trade-wind blows most frequently, especially when the sun approaches the tropic of Capricorn; the wind next to it in frequency is the north-west, and next to that is the south-west. From S. lat. 40° to 50° the prevailing wind is the north-west, and next the south-west. From 50° to 60° the most frequent wind is also the north-west, and next to it is the west.

250. Thus it appears that the trade-winds sometimes extend farther into the south temperate zone than their usual limits, particularly during summer; that beyond their influence the winds are commonly westerly, and that they blow in the following order: north-west, south-west, west.

251. Thus have we finished the history of the direction of the winds. In the torrid zone they blow constantly from the north-east on the north side of the equator, and from the south-east on the south side of it. In the north temperate zone they blow most frequently from the south-west; in the south temperate zone from the north-west, changing, however, frequently to all points of the compass, and in the north temperate zone blowing particularly during spring from the north-east.

252. The phenomena that result from the vibration of elastic aëriform bodies usually form an important part of the science of pneumatics; we have, however, already furnished the reader with a general treatise on this subject under its proper head, and we now advert to it only to complete that branch of acoustics which could not have been understood without a reference to the principles of optics. We may commence with the analogy which is usually supposed to exist between *light* and *sound*. On this subject we find Dr. Young full and interesting.

253. Ever since the publication of Sir Isaac Newton's incomparable writings, his doctrines of the emanation of particles of light from lucid substances, and of the formal pre-existence of colored rays in white light, have been almost universally admitted in this country, and but little opposed in others. Leonard Euler indeed, in several of his works, has advanced some powerful objections against them, but not sufficiently powerful to justify the dogmatical reprobation with which he treats them; and he has left that system of an ethereal vibration, which after Huygens and some others he adopted, equally liable to be attacked on many weak sides. Without pretending to decide positively on the controversy, it is conceived that some considerations may be brought forwards, which may tend to diminish the weight of objections to a theory similar to the Huygenian. There are also one or two difficulties in the Newtonian system which have been little observed. The first is, the uniform velocity with which light is supposed to be projected from all luminous bodies, in consequence of heat, or otherwise. How happens it that, whether the projecting force is the slightest transmission of electricity, the friction of two pebbles, the lowest degree of visible ignition, the white heat of a wind furnace, or the intense heat of the sun itself, these wonderful corpuscles are always propelled with one uniform velocity? For, if they differed in velocity, that difference ought to produce a different refraction. But a still more insuperable difficulty seems to occur in the partial reflection from every refracting surface. Why, of the same kind of rays, in every circumstance precisely similar, some should always be reflected, and others transmitted, appears in this system to be wholly

inexplicable. That a medium resembling, in many properties, that which has been denominated ether, does really exist, is undeniably proved by the phenomena of electricity; and the arguments against the existence of such an ether throughout the universe have been pretty sufficiently answered by Euler. The rapid transmission of the electrical shock shows that the electric medium is possessed of an elasticity as great as is necessary to be supposed for the propagation of light. Whether the electric ether is to be considered as the same with the luminous ether, if such a fluid exists, may perhaps at some future time be discovered by experiment. The uniformity of the motion of light in the same medium, which is a difficulty in the Newtonian theory, favors the admission of the Huygenian; as all impressions are known to be transmitted through an elastic fluid with the same velocity. It has been already shown that sound, in all probability, has very little tendency to diverge: in a medium so highly elastic as the luminous ether must be supposed to be, the tendency to diverge may be considered as infinitely small, and the grand objection to the system of vibration will be removed. It is not absolutely certain that the white line visible in all directions on the edge of a knife, in the experiments of Newton and of Mr. Jordan, was not partly occasioned by the tendency of light to diverge. Euler's hypothesis, of the transmission of light by an agitation of the particles of the refracting media themselves, is liable to strong objections; according to this supposition the refraction of the rays of light, on entering the atmosphere from the pure ether which he describes, ought to be a million times greater than it is. For explaining the phenomena of partial and total reflection, refraction, and inflection, nothing more is necessary than to suppose all refracting media to retain, by their attraction, a greater or less quantity of the luminous ether, so as to make its density greater than that which it possesses in a vacuum, without increasing its elasticity; and that light is a propagation of an impulse communicated to this ether by luminous bodies: whether this impulse is produced by a partial emanation of the ether, or by vibrations of the particles of the body, and whether these vibrations are, as Euler supposed, of various and irregular magnitudes, or whether they are uniform, and comparatively large, remains to be hereafter determined. Now, as the direction of an impulse transmitted through a fluid, depends on that of the particles in synchronous motion, to which it is always perpendicular, whatever alters the direction of the pulse will inflect the ray of light. If a smaller elastic body strike against against a larger one, it is well known that the smaller is reflected more or less powerfully, according to the difference of their magnitudes: thus, there is always a reflection when the rays of light pass from a rarer to a denser stratum of ether; and frequently an echo when a sound strikes against a cloud. A greater body striking a smaller one propels it, without losing all its motion; thus the particles of a denser stratum of ether do not impart the whole of their motion to a rarer, but, in their effort to proceed, they are recalled by the attraction of the refracting substance with equal force; and thus a reflection is always secondarily produced, when the rays of light pass from a denser to a rarer stratum. The repulsion of inflected rays has been very ably controverted by Mr. Jordan, the ingenious author of a late publication on the Inflection of Light. It has already been conjectured by Euler that the colors of light consist in the different frequency of the vibrations of the luminous ether: it does not appear that he has supported this opinion by any argument; but it is strongly confirmed by the analogy between the colors of a thin plate and the sounds of a series of organ pipes. The phenomena of the colors of thin plates require, in the Newtonian system, a very complicated supposition, of an ether anticipating by its motion the velocity of the corpuscles of light, and thus producing the fits of transmission and reflection; and even this supposition does not much assist the explanation. It appears, from the accurate analysis of the phenomena which Newton has given, and which has by no means been superseded by any later observations, that the same color recurs whenever the thickness answers to the terms of an arithmetical progression. Now this is precisely similar to the production of the same sound by means of a uniform blast, from organ-pipes which are different multiples of the same length. Supposing white light to be a continued impulse or stream of luminous ether, it may be conceived to act on the plates as a blast of air does on the organ-pipes, and to produce vibrations regulated in frequency by the length of the lines which are terminated by the two refracting surfaces. It may be objected that, to complete the analogy, there should be tubes, to answer to the organ-pipes: but the tube of an organ-pipe is only necessary to prevent the divergence of the impression, and in light there is little or no tendency to diverge; and, indeed, in the case of a resonant passage, the air is not prevented from becoming sonorous by the liberty of lateral motion. It would seem that the determination of a portion of the track of a ray of light through any homogeneous stratum of ether is sufficient to establish a length as a basis for colorific vibrations. In inflections, the length of the track of a ray of light through the inflecting atmosphere may determine its vibrations: but, in this case, as it is probable that there is a reflection from every part of the surface of the surrounding atmosphere, contributing to the appearance of the white line in every direction, in the experiments already mentioned, so it is possible that there may be some second reflection at the immediate surface of the body itself, and that, by mutual reflections between these two surfaces, something like the anguiform motion suspected by Newton may really take place; and then the analogy to the colors of thin plates will be still stronger. A mixture of vibrations, of all possible frequencies, may easily destroy the peculiar nature of each, and concur in a general effect of white light. The greatest difficulty in this system is, to explain the different degree of refraction of differently colored light, and the separation of white light in refraction: yet, considering how imper-

fect the theory of elastic fluids still remains, it cannot be expected that every circumstance should at once be clearly elucidated. It may hereafter be considered how far the excellent experiments of count Rumford, which tend very greatly to weaken the evidence of the modern doctrine of heat, may be more or less favorable to one or the other system of light and colors.

254. Mr. Wheatstone's experiments are of a very novel and curious character, and as such must be next adverted to.

255. The application of the principles of science to ornamental and amusing purposes contributes, in a great degree, to render them extensively popular; for the exhibition of striking experiments induces the observer to investigate their causes with additional interest, and enables him more permanently to remember their effects.

256. But the kaleidophone possesses higher claims to attention; for it exemplifies an interesting series of natural phenomena, and renders obvious to the common observer what has hitherto been confined to the calculations of the mathematician; it presents another proof that, however remote from common observation the operations of nature may be, the most beautiful order and symmetry prevail through all.

257. In the property of 'creating beautiful forms,' the kaleidophone resembles the celebrated invention of Dr. Brewster, from which its name is modified; but to the instrument itself, and its mode of action, it is almost superfluous to say there is no similarity. Previously to entering into an explanation of its construction and effects, the following brief summary may suffice to give a general idea of the nature of the experiments it is intended to illustrate.

258. These experiments principally consist in subjecting to ocular demonstration the orbits or paths described by the points of greatest excursion in vibrating rods, which in the most frequent cases, those of the combinations of different modes of vibration, assume the most diversified and elegant curvilinear forms. We are indebted to Dr. T. Young for the first observation of these phenomena; the following account of his experiments is quoted from the Philosophical Transactions for 1800. 'Take one of the lowest strings of a square piano-forte, round which a fine silvered wire is wound in a spiral form; contract the light of a window, so that when the eye is placed in a proper position, the image of the light may appear small, bright, and well defined, on each of the convolutions of the wire. Let the chord be now made to vibrate, and the luminous point will delineate its path like a burning coal whirled round, and will present to the eye a line of light, which, by the assistance of a microscope, may be very accurately observed. According to the different ways by which the wire is put in motion, the form of this path is no less diversified and amusing than the multifarious forms of the quiescent lines of vibrating plates discovered by professor Chladni; and it is, indeed, in one respect even more interesting, as it appears to be more within the reach of mathematical calculation to determine it.'

259. The extremely limited extent of the excursions of a vibrating chord prevents its motion from being distinctly observed by the naked eye, but as the rods employed in the present experiments can extend their excursions to nearly two inches, and as the means employed greatly increase the intensity of the light, the phenomena are exhibited in a far more evident manner. The entire track of each orbit is rendered simultaneously visible by causing it to be delineated by a brilliantly luminous point; and, the figure being completed in less time than the duration of the visual impression, the whole orbit appears as a continued line of light. As, besides the changes which result from the combinations of the primitive with the higher modes of vibration, the figures of the orbits are affected by the form of the rod, by the extent of the excursions of the vibrations, by the mode of producing the motions, and by many other circumstances, a great variety of pleasing and regular forms is obtained. This variety is also enhanced by giving the same motions to a number of symmetrically disposed luminous points, the mutual intersections of the orbits of which produce innumerable elegant forms; and the appearances may be still more variegated by occasionally causing these points to reflect differently-colored lights.

260. The apparatus for exhibiting these experiments consists of a circular board about nine inches in diameter, into which are perpendicularly fixed, at equal distances from the circumference and from each other, three steel rods, each about a foot in length. The first rod is cylindrical, about one-tenth of an inch in diameter, and is surmounted by a spherical bead. The only beads well adapted for this purpose are made of extremely thin glass silvered on the interior surface, and about one-sixth of an inch in diameter; they are to be obtained at the shops under the name of steel beads. The protuberances at the apertures must be removed or blackened, otherwise the reflections from them will render the images confused. To produce the colored tracks, these beads must be coated with transparent colors, such as are ordinarily used for painting on glass; the light will then be reflected through the colored surface; but, in beads made of colored glass, the reflection being made from the external surface, shows only white light. The bead is cemented into a small brass cup screwed to the top of the wire, which concentrates and reflects the light which falls upon it. The second is a similar rod, upon the upper extremity of which is placed a plate moving on a joint, so that its plane may be rendered either horizontal, oblique, or perpendicular; this plate is adapted to the reception of the objects, which consist of beads differently colored and arranged on pieces of black card in symmetrical forms. The third is a four-sided prismatic rod, and a similar plate is attached to its extremity for the reception of the same objects. Another rod is fixed at the centre of the board; this is bent to a right angle, and is furnished with a bead similarly to the first-mentioned rod. A small nut and screw are fixed to the board near the lower end of the first rod,

in order by pressing upon it to render occasionally its rigidity unequal. A hammer, softened by a leather covering, is employed to strike the rods; and a violin-bow is necessary to produce some varieties of effect.

261. We may now proceed to describe the different appearances which the rods present when in action, and to give directions for the production of the different effects, following the order in which the rods have been previously mentioned.

262. On causing the straight rod to vibrate, so that its lowest sound be produced. The most simple mode of vibration of a rod vibrating transversely, when one of its extremities is fixed and the other is free, is that in which the entire rod makes its vibrations alternately on each side of the axis, which is nowhere intersected by the curve, but only touched at the fixed end. This gives the gravest sound which can be produced from the rod. In the other modes of vibration the axis is intersected by the curve one, two, three, or more times. The best means to command the production of these sounds is to touch a node of vibration lightly with the finger, and to put a vibrating part in motion by a violin-bow. In the second sound, the number of vibrations is to that of the first as $5^2 : 2^2$, or 25 : 4; the difference of the sounds is, therefore, two octaves and an augmented fifth. Separating the first sound from the series, the number of the vibrations of all the others will be to one another as the squares of the numbers 3, 5, 7, 9, &c.; the third, in which there are three nodes, will therefore exceed the second by an octave and an augmented fourth; in the fourth the acuteness will be augmented by nearly an octave; in the fifth by nearly a major sixth, &c. To reduce to the same pitch all the proportions of the sounds which such a rod is capable of producing, Mr. W. regards the sound correspondi.g with the most simple motion as the C one octave lower than the lowest of the piano-forte; the proportions of the sound will then be—

Number of nodes .	0	1	2	3	4	5
Sounds . . .	$\bar{C}$	G※^{2}	D^4	D^5—	B♭^{5}	F^8+
Numbers, the squares of which correspond with these sounds .	2	(5) 3	5	7	9	11

The possible series of sounds, regarding the fundamental as unity, will therefore be—1, $6\frac{1}{4}$, $17\frac{13}{36}$, $34\frac{1}{36}$, $56\frac{1}{4}$, &c.; or expressed in integral numbers —36, 225, 625, 1225, 2025, &c.—Chladni, Traité d' Acoustique, p. 91. As it is seldom that the motions of a cylindrical rod can be confined to a plane, the vibrations will almost always be combined with a circular motion. When the pressure on the fixed end is exerted on two opposite points, and the rod put in motion in the direction of the pressure, the following progression in the changes of form will be distinctly observed: the track will commence as a line, and almost immediately open into an ellipse, the lesser axis of which will gradually extend as the larger axis diminishes, until it becomes a circle; what was before the less will then become the larger axis, and thus the motions will alternate until, from their decreasing magnitudes, they cease to be visible. In the case just described the ellipses make a right angle with each other; but by altering the direction of the motion, so as to render it oblique to the direction of the pressure, they may be made to intersect under any required angle, and when this angle = 0 the motion will be merely vibratory.

263. Every single sound formed by the subdivisions of the rod will present similar appearances, but the excursions will be smaller as the sound is higher, or, which is the same thing, as the number of the vibrations increases.

264. In the most simple case of the co-existence of two sounds, shown by putting the entire rod in motion, and producing also a higher sound by the friction of a bow; the original figure will appear waved or indented, and, as unity is to the number of indentations, so will the number of vibrations in the lower sound be to the number in the higher sound. On varying the mode of excitation, by striking the rod in different parts and with different forces, very complicated and beautiful curvilinear forms may be obtained.

265. Placing the hand on the lower part of the rod, below the place at which it is excited, the excursions of the motions will rapidly decrease and exhibit spiral figures.

266. To obtain the figures with brilliancy and distinctness, a single light only should be employed, as that of the sun, a lamp, or a candle; rays of light proceeding from several points, as from a number of candles, or from the reflection of the clouds, occasion the track to be broad and indistinct; but double lights may be employed with effect, provided they be of equal intensity and symmetrically placed; each bead will then describe two similar figures. The appearances, in a bright sunshine, are remarkably vivid and brilliant.

267. Although very beautiful and varied forms may be produced from the motion of a single point, yet the compound figures, which are presented by objects formed by a number of points, offer appearances still more pleasing to the eye.

268. An object being placed horizontally on the plate of the second rod, and the rod being put in motion, the mutual intersections of the points each describing a similar figure, present to the eye complicated, yet symmetrical figures, resembling elegant specimens of engine-turning.

269. When the plate is horizontal, the figures are all in one plane, but if it be inclined or perpendicular, the curves being then made in parallel planes, gives the idea of a solid figure, and in some cases the appearances are particularly striking.

270. Complementary colors alone should be employed in the objects; for these, harmonising together, give greater pleasure to the eye than an injudicious combination of discordant tints: the intensities should be occasionally varied, and colorless light intermingled with the different shades.

271. When the prismatic rod is put in motion, in the direction of either of its sides, the points move only rectilineally; but, when the motion is applied in an oblique direction, a variety of compound curves is shown: this rod is principally employed to exhibit the optical phenomena which will be afterwards mentioned.

272. When a rod is straight, the curve produced by any point describing its motion is always in the same plane; but in a rod bent to any angle, the two parts moving most frequently in different directions, curves are produced whose parts do not lie in the same plane. A few trials will soon indicate the best way of applying the motion, so as to cause the two parts to vibrate in different directions.

273. When dark objects are substituted for luminous ones, their tracks become nearly invisible, and, from the onger duration of the visual impression at the limits of vibration, the images are multiplied in proportion to the number of points at which they are retarded. Place horizontally, on the second rod, a word printed or written on a piece of card; in the lowest mode of vibration, at the opposite limits of the excursions, two legible images of the word will be distinctly seen, and but an indistinct shade, occasioned by the tracks of the letters, will appear in the intermediate space: the vibratory motion is imperceptible to the eye; the images will, therefore, appear stationary in this respect, but the diminution of the excursions will cause them to approximate very slowly and gradually towards the centre: this diminution operates so gradually as to allow the images to superpose each other completely at each recurring vibration, without producing any intermingling or confusion.

274. On placing the object perpendicularly, the two images will appear in parallel planes, the furthest image appearing through the first apparent surface. Small pictures have a singular effect applied in this manner.

275. When other sounds co-exist with the fundamental, the images are multiplied, but they become fainter as their number increases: these multiplied images are equally visible whether the vibrations be rectilineal, elliptical, or circular.

276. As that property of vision which occasions the apparent duration in the same places of visible images, after the objects which excite them have changed their positions, has enabled us to submit to inspection the phenomena above described, it may not be irrelevant to subjoin a description of an apparatus which illustrates the transient duration of the impressions of light in a very evident manner.

277. At the back of a wooden frame, about six inches in height and breadth, and from one to three inches or more in depth, a circular plate of glass is placed, upon which a design is painted with transparent colors; at the front is placed, parallel to the glass, a circle of tin, covered on its exterior surface with white paper, and having the space between two adjacent radii cut out. This circle moves freely on its centre round an axis, supported by a bar in front, and is put into rapid and regular motion by the application of any mechanical principle proper for the purpose; and a catch is so placed that, when the motion ceases, the aperture shall be concealed by the bar which supports the axis.

278. If a light be placed behind the transparent painting, and still better if it be concentrated by a lens, on making the circle revolve with rapidity, the whole of the picture will be rendered visible at one view, although but very limited portions are successively presented to the eye.

279. The intensity will differ in proportion to the excess of the transmitted light above that which falls in front of the circle; it will, therefore, increase the distinctness of the picture, to darken the latter as much as possible.

280. The next series of experiments by Mr. Wheatstone are of still greater importance than those already presented to our readers. They relate to the phonic molecular vibrations, and are incapable of abridgement. Mr. W. commences with an examination of what he terms linear phonics, and arranges them under two heads.

281. 'Transversal: making their oscillations at right angles to their axis. 1. Capable of tension, or variable rigidity: chords, or wires. 2. Permanently rigid: rods, fork, rings, &c. Longitudinal: making their oscillations in the direction of their axis. 1. Columns of aëriform fluids or liquids; cylindric and prismatic rods. Superficial phonics. 1. Capable of tension: extended membranes. 2. Permanently rigid: laminæ, bells, vases, &c. Solid phonics. 1. Volumes of aëriform fluids.

282. The sensation of sound can be excited by any of these bodies when they oscillate with sufficient rapidity, either entire, or divided into any number of parts in equilibrium with each other. The laws of these subdivisions differ in the various phonics according to their form and mode of connexion or insulation; and the velocities of the oscillations, or degrees of tune, depend on the form, dimensions, mode of connexion, mode of division, and elasticity of the body employed. The points of division in linear phonics are called nodes, and the boundaries of the vibrating parts of elastic surfaces are termed nodal lines. The parts of which the oscillatory portions have their greatest excursions are named centres of vibration; these are always at the greatest mean distances from the nodal points or lines. These mechanical oscillations are not however themselves the immediate causes of sound; they are but the agents in producing in the bodies themselves, and in other contiguous substances, isochronous vibration of certain particles varying in magnitude according to the degree of tune. 'I convinced myself,' observes Mr. W., 'of this important fact by the following simple experiment: I took a plate of glass capable of vibrating in several different modes, and covered it with a layer of water; on causing it to vibrate by the action of a bow, a beautiful reticulated surface of vibrating particles commenced at the centres of the vibrating parts, and increased in dimensions as the excursions were made larger. When a more acute sound was produced the centres consequently became more numerous and the number of coexisting vibrating particles likewise increased, but their magnitudes proportion-

ally diminished. The sounds of elastic laminæ are generally supposed to be owing to the entire oscillations of the simple parts as shown by Chladni, when, by strewing sand over the sonorous plates, he observed the particles repulsed by the vibrating parts accumulate on the nodal lines, and indicate the bounds of the sensible oscillation: the water laid on its surface would, on account of its cohesion to the glass, show no peculiar phenomena, but the appearances above described clearly demonstrate that the oscillating parts consist of a number of vibrating particles of equal magnitudes, the excursions of which are greatest at the centre of vibration, and gradually become less as they recede further from it, until they become almost null at the nodal lines. To multiply these surfaces and to observe whether the magnitudes of these particles vary in different media, in a glass vessel of a cylindric form, I superposed three immiscible fluids of different densities; namely mercury, water, and oil. On producing the sounds corresponding with each mode of division I observed a number of vibrating parts agreeing with the sound, and showing similar appearances to the plate, formed on the surfaces of each of the fluids; not the least agitation appeared in the uniform parts. I afterwards inserted this glass in another vessel of water in order to observe the vibrations of the external surface, and found the same results as in the interior, though the levels of the surfaces were different.

283. 'The most accurate method to observe these phenomena is by employing a metallic plate of small dimensions, which must be fixed horizontally in a vice at one end, and covered on its upper side with a surface of water: on causing it to oscillate entirely by means of a bow, a regular succession of these vibrating corpuscles will appear arranged parallel to the two directions of the plate; and, if the action of the bow be rendered continuous, their absolute number might be counted with the aid of a micrometer. Diminishing the oscillating part of the plate to one-half of its length, the double octave to the preceding was heard, agreeably to the established rule that the velocities of the oscillations are inversely as the squares of the lengths; four vibrating corpuscles then occupied the space before occupied by one, and the absolute number was double to that in the former instance; but the absolute number of these corpuscles have no influence whatever on the degree of tune, which entirely depends on their relative magnitude in the same substance; theory shows us that in plates of this description alteration of breadth does not affect the degree of tune; let us therefore reduce this half of the plate to half its breadth, and we shall find the note remain the same; but the absolute number of the corpuscles will in this case be equal to that in the entire plate. Let us now take two plates of equal lengths and breadths, but one double in thickness to the other; the rule is, that the velocities of the oscillations are as the thicknesses of the plates; we shall therefore, in the thicker plate, see a double number of particles to that of the other, occupying the same extent of surface. The last circumstance in which two plates may differ is their specific rigidity, and in this respect it will be found that two plates of exactly equal dimensions, and covered with the same number of vibrating corpuscles of equal magnitudes, but of different substances, differ in sound; therefore the absolute magnitudes of the particles cannot be assumed as a standard of tune, unless regulated by the specific rigidity.

284. 'Unassisted by any means of actual admeasurement, the above are but the proximate results sensible to the eye; more extended and accurate experiments are necessary to confirm the results with mathematical certainty. As the absolute magnitudes of these particles will, I imagine, be hereafter a most useful element for calculation, I will here indicate the most effectual way I am acquainted with to arrive at this knowledge. A thick metallic slip of considerable length and breadth, bent similarly to a tuning fork, and fixed at its curved part in a vice, is very easily excited by friction, and a more considerable surface of regularly arranged vibrating particles is seen than in most other superficies; any description of common exciter may be employed. When this bent plate is excited by percussion, the particles, before their disappearance, will assume an apparent rotatory motion, on account of the force exerted, and its susceptibility of continuing the vibrations. Employing a parallelopedal rod, the appearances of the higher modes of subdivisions are particularly neat; the entire vibrating parts between the nodes form ellipses, and the semi-part at the free end a regular half of the same figure. It is important to remark that the crispations of the water only appear on the sides in the plane of oscillation; the other two sides, on one of which the exciter must be applied, do not show similar appearances.

285. 'I have also rendered the phonic molecular vibrations visible, when produced by the longitudinal oscillations of a column of air; the following were the means employed:—I placed the open end of the head of a flute or flagelet on the surface of a vessel of water, and, on blowing to produce the sound, I observed similar crispations to those described above, forming a circle round the end of the tube, and afterwards appearing to radiate in right lines; on the harmonics of the tube being sounded, the crispations were correspondently diminished in magnitude. These phenomena will be more evident if the tube be raised a little from the surface of the liquid, and a thin connecting film be left surrounding it; the vibrating particles will then occupy a greater space, and be more sensible.

286. 'The existence of the molecular vibrations being now completely established, it becomes a critical question, in what manner the sensible oscillations induce these vibrating particles. I do not know whether what I am now going to adduce will be admitted as the right explanation, but it is certainly analogous, so far as the superficial and transversal linear oscillations are concerned. A flexible surface, covered with a coat of resinous varnish, being made to assume any curve, the cohesion of the varnish will be destroyed in certain parts, and a number of cracks will be observed, more regularly dis-

posed as the force inducing the curve has been more regularly applied; when the original position of the surface is restored, the cracks will be imperceptible, but will again appear at every subsequent motion. Be this as it may, these particles are invariable concomitants of the sensible oscillations, and there is no reason to suppose otherwise than that their vibrations are isochronous with them. To avoid confusion, I have restricted the word vibrations to the motions of the more minute parts, and the term oscillations to those of the sensible divisions. We may reasonably suppose that the molecular vibrations pervade the entire substance of a phonic; their excursions, however, are not the same in all parts, and they can only be rendered visible when these excursions are large; they may be so few in number as to be entirely inaudible, as in their transmission through linear conductors; but, however few, when they are properly directed, they induce the mechanical divisions of sonorous bodies, each of which will give birth to numerous vibrating corpuscles whose excursions are greater, and the sound will be rendered audible. Dr. Savart has well investigated the modes of division in surfaces put in motion by communicated vibrations. All those phonics, whose limited superficies preclude them from exciting in themselves a sufficient number of vibrating corpuscles, when insulated, produce scarcely any perceptible sound, as extended chords, tuning forks, &c.; but those whose superficies or solidities are more extended, as bells, elastic laminæ, columns of air, &c., produce sufficient volume of sound without accessory means.

287. 'Loudness of sound is dependent on the excursions of the vibrations; volume, or fulness of sound, on the number of co-existing particles put in motion. Thus the tones of the Æolian harp, on account of the number of subdivisions of the strings, are remarkably beautiful and rich, without possessing much power; and the sounds of an Harmonica glass, in which a greater number of particles are excited than by any other means, are extraordinarily so united, according to the method of excitation, with considerable intensity; their pervading nature is one of the greatest peculiarities of these sounds.

288. 'The following is a recapitulation of the various properties of sound, which are attributable to modifications of the vibrating corpuscles:—

The tune	Depends on the	velocities of the vibrations.
The time		continuance of the vibrations.
The intensity		excursions of the vibrations.
The richness, or volume		number of co-existing vibrations.
The quantity (timbre)		magnitudes of the vibrating corpuscles.

289. 'It has often been thought necessary to admit the existence of more minute motions than the sensible oscillations, in order to account for many phenomena in the production of sound. Perrault, in his Essai du Bruit, insisted on their necessity more than any other author I have read. He imagined that the vibrations have a much greater velocity than the oscillations which cause them, but the experiment he adduced to prove this is far from conclusive; he mistook for these vibrations the oscillations of the subdivisions of the long string he employed. Other distinguished philosophers have had ideas of a similar nature, and Chladni thinks their existence necessary to account for the varieties of quality. I, however, conceived I was the first who had indicated these phenomena by experiment, until a few days ago repeating them, together with the others which form the subject of this paper, in the presence of Professor Oersted, of Copenhagen, he acquainted me with some similar experiments of his own. Substituting a very fine powder, Lycopodion, instead of the sand used by Chladni, for showing the oscillations of elastic plates, this eminent philosopher found the particles not only repulsed to the nodal lines, but at the same time accumulated in small parcels, on and near the centres of vibration; these appearances he presumed to indicate more minute vibrations, which were the causes of the quality of the sound; subsequently he confirmed his opinion, by observing the crispations of water, or alcohol, on similar plates, and showed that the same minute vibrations must take place in the transmitting medium, as they were equally produced in a surface of water, when the sounding plate was dipped into a mass of this fluid. These experiments were inserted in Lieber's History of Natural Philosophy, 1813.

290. '*Rectilineal Transmission of Sound.*—As the laws of the communication of the phonic vibrations are more evident in linear conductors, I shall confine the present article to a summary of their principal phenomena.

291. 'In my first experiments on this subject, I placed a tuning fork, or a chord extended on a bow, on the extremity of a glass or metallic rod, five feet in length, communicating with a sounding board; the sound was heard as instantaneously as when the fork was in immediate contact, and it immediately ceased when the rod was removed from the sounding-board, or the fork from the rod. From this it is evident that the vibrations, inaudible in their transmission, being multiplied by meeting with a sonorous body, become very sensibly heard. Pursuing my investigations on this subject, I have discovered means for transmitting, through rods of much greater lengths, and of very inconsiderable thicknesses, the sounds of all musical instruments dependent on the vibrations of solid bodies, and of many descriptions of wind instruments. It is astonishing how all the varieties of tune, qualities, and audibility, and all the combinations of harmony, are thus transmitted unimpaired, and again rendered audible by communication with an appropriate receiver. One of the practical applications of this discovery has been exhibited in London for about two years under the appellation of The Enchanted Lyre. So perfect was the illusion in this instance from the intense vibratory state of the reciprocating instrument, and from the inter-

ception of the sounds of the distant exciting one, that it was universally imagined to be one of the highest efforts of ingenuity in musical mechanism. The details of the extensive modifications of which this invention is susceptible, I shall reserve for a future communication; the external appearance and effects of the individual application above-mentioned have been described in the principal periodical journals of the day.

292. 'The transmission of the vibrations through any communicating medium, as well as through linear conductors, is attended by peculiar phenomena; pulses are formed similar to those in longitudinal phonics, and consequently the centres of vibration and the nodes are reproduced periodically at equal distances; in this we observe an analogous disposition with regard to light. I had intended to include in this paper all the analogical facts I have observed illustratory of the identity of the causes of these two principal objects of sensation, but want of time, and the danger of delay, now the subject is occupying so much the attention of the scientific world, has induced me hastily to collect the present experiments, and to defer the others for a future opportunity.

293. 'The thicknesses of conductors materially influence the power of transmission, and there is a limit of thickness, differing for the different degrees of tune, beyond which the vibrations will not be transmitted. The vibrations of acute sounds can be transmitted through smaller wires than those of grave sounds: a proof of this is easy: attach a tuning-fork to one end of a very small wire, and apply the other end to the ear, or a sounding-board; on striking the fork rather hard, two co-existing sounds will be produced, that which is more acute will be distinctly heard, but the other will not be transmitted. If the vibrations of a tuning-fork be conducted through a piece of brass wire, of the size and thickness of a large needle, the sound, imperfectly transmitted, will become more audible by the pressure of the fingers on the conducting wire; but, if a steel wire of the same length and thickness be employed, the sound will be unaltered by any pressure, because steel has a greater specific elasticity than brass.

294. *Polarisation of sound.*—'Hitherto I have only considered the vibrations in their rectilineal transmission; I shall now demonstrate that they are peculiarly affected, when they pass through conductors bent at different angles. I connected a tuning-fork with one extremity of a straight conducting rod, the other end of which communicated with a sounding board; on causing the tuning-fork to sound, the vibrations were powerfully transmitted, as might be expected from what has already been explained; but, on gradually bending the rod, the sound progressively decreased, and was scarcely perceptible when the angle became a right one; as the angle was made more acute, the phenomena were produced in an inverted order; the intensity gradually increased as it had before diminished, and, when the two parts were nearly parallel, it became as powerful as in the rectilineal transmission. By multiplying the right angles in a rod, the transmission of the vibrations may be completely stopped.

295. 'To produce these phenomena, however, it is necessary that the axis of the oscillations of the tuning-fork should be perpendicular to the plane of the moveable angle; for, if they be parallel with it, they will be still considerably transmitted. The following experiment will prove this:—I placed a tuning-fork perpendicularly on the side of a rectilinear rod; the vibrations were, therefore, communicated at right angles; when the axis of the oscillations of the fork coincided with the rod, the intensity of the transmitted vibrations was at its maximum; in proportion as the axis deviated from parallelism, the intensity of the transmitted vibrations diminished; and, lastly, when it became perpendicular, the intensity was at its minimum. In the second quadrant, the order of the phenomena was inverted as in the former experiment, and a second maximum of intensity took place when the axis of the oscillations had described a semicircumference, and had again become parallel, but in an opposite direction. When the revolution was continued, the intensity of the transmitted vibrations was varied in a similar manner; it progressively diminished as the axis of the oscillations deviated from being parallel with the rod, became the least possible when it arrived at the perpendicular, and again augmented until it remained at its first maximum, which completed its entire revolution.

296. 'The phenomena of polarisation may be observed in many corded instruments: the chords of the harp are attached at one extremity to a conductor which has the same direction as the sounding board; if any cord be altered from its quiescent position, so that its axis of oscillation shall be parallel with the bridge, or conductor, its tone will be full; but, if the oscillations be excited so that their axis shall be at right angles with the conductor, its tone will be feeble. By tuning two adjacent strings of the harp-unisons with each other, the differences of force will be sensible to the eye in the oscillations of the reciprocating string according to the direction in which the other is excited.

297. 'It now remains to explain the nature of the vibrations which produce the phenomena, the existence of which has been proved by the preceding experiments. The vibrations generally assume the same direction as the oscillations which induce them; in a longitudinal phonic the vibrations are parallel to its axis; in a transversal phonic, they are perpendicular to this direction; a circular or an elliptic form can be also given to the vibrations by causing the oscillations to assume the same forms. Any vibrating corpuscle can induce isochronous vibrations of similar contiguous corpuscles in the same plane either parallel with, or perpendicular to, the direction of the original vibrations, and the polarisation of the vibrations consists in the similarity of their directions, by which they propagate themselves equally in the same plane; therefore, the vibrations being transmitted through linear conductors, it is the plane in which the vibrations are made that determines their transmission, or non-transmission, when the direction is altered.

A longitudinal or a transversal vibration may be transmitted two ways to a conductor bent at right angles; their axis may be in that direction, as to be in the same plane with the right angle, in which case the former will be transversally, or the latter longitudinally transmitted in the new direction; or their axis may be perpendicular to the plane of this new direction, under which circumstances neither can be communicated. In explaining the polarisation of light, there is no necessity to suppose that the reflecting surfaces act on the luminous vibrations by any actual attracting or repulsing force, causing them to change their axes of vibrations; the direction of the vibrations in different planes, as I have proved exist in the communication of sound, is sufficient to explain every phenomenon relative to the polarisation of light.

298. 'Let us suppose a number of tuning forks oscillating in different planes, and communicating with one conducting rod; if the rod be rectilinear, all the vibrations will be transmitted; but, if it be bent at right angles, they will undergo only a partial transmission; those vibrations whose planes are perpendicular, or nearly so, to the plane of the new direction, will be destroyed. The vibrations are thus completely polarised in one direction, while passing through the new path, and, on meeting with a new right angle, they will be transmitted or not, accordingly as the plane of the angle is parallel with, or perpendicular to, the axes of the vibrations. In this point of view, the circumstances attending the phenomena are precisely the same as in the elementary experiment of Malus on the polarisation of light.

299. 'Double refraction is a consequence of the laws of polarisation, by which a combination of vibrations having their axes in different planes, after travelling in the same direction, are separated into two other directions, each polarised in one plane only. That this well-known property of light has a correspondent in the communication of phonic vibrations I shall now demonstrate. When two tuning forks, sounding different notes by a constant exciter, and making their oscillations perpendicularly to each other, have their vibrations transmitted at the same time through one rod, at the opposite extremity of which two other conductors are attached at right angles, and when each of these conductors is parallel with one of the axes of the oscillations of the forks, on connecting a sounding-board with either conductor, those vibrations only will be transmitted through it which are polarised in the same plane with the angle made by the two rods through which the vibrations pass; either sound may be thus separately heard, or they may both be heard in combination by connecting both the conductors with sounding-boards.

300. 'The phenomena of diffraction regarding only the form of the surfaces, or the superficies over which the vibrations extend, are by the conformation of the organs of hearing, not of any consequence to the perception of sound, though the same phenomena, when the chromatic vibrations are concerned, are very evident to the eye. They, however, undoubtedly take place equally in both instances, and may be well explained by the theory already laid down. Each separate vibration propagating itself in the plane of its vibrating axis, a number of vibrations in different planes, after passing through an aperture, naturally expand themselves transversely as well as rectilineally, and thereby occupy a greater space than they would were they only longitudinally transmitted.

301. 'I have still to indicate a new property of the phonic vibrations, but, whether it is analogous to any of the observed phenomena of light, I am yet ignorant. When the source of the vibrations is in progressive motion, the vibrations emanating from it are transmitted when the conductor is rectilineal and parallel with the original direction; and they are destroyed when the conductor is perpendicular to the direction, though the axis of vibration and the conductor, being in both instances in the same place, would transmit the vibrations were the phonic stationary. These circumstances are proved by the following experiments:—When a tuning fork placed perpendicularly to a rod, communicating at one or both extremities with sounding-boards, and caused to oscillate with its vibrating axis parallel with the rod, moves along the rod, preserving at the same time its perpendicularity and parallelism, the vibrations will not be transmitted while the movement continues, but the transmission will take place immediately after it has remained motionless. When the tuning fork moves on the upper edge of a plane perpendicular to a sounding board, the vibrations rectilineally transmitted will not be influenced by the progressive motion.'

302. A general notion of the velocity with which sound moves, has already been given under the article ACOUSTICS; and we may now furnish a few important data which will fully explain the precise nature of the disturbing force.

303. Chladni and Jacquin, of Vienna, made about ten years ago some experiments, with a view to determine the sonorous properties of different gases; the results of which, being curious, may be stated here. By causing a small tin pipe, brought into contact with a cock in the neck of a bell-glass, to be blown by gas contained in a bladder, applied to the external aperture of the cock, these philosophers observed that the sound was a semi-tone lower with azotic and oxygen gas than with atmospheric air; a third lower with carbonic acid gas; and nearly the same with nitrous gas; but, with oxygen gas, from nine to eleven tones higher than the air that surrounds us. A mixture of azote and oxygen, in the same proportions as in the atmospheric air, gave the same tone as the latter; but when the mixture of these gases was not uniform, the sounds were totally discordant. The experiments of Chladni and Jacquin were very different from those of Priestley and Perolle, on sound in different kinds of gases. The experiments of the last-mentioned philosophers related only to the intensity with which the vibrations of another elastic body (of a bell struck by a hammer) are conducted through these gases. Perolle contradicts Priestley's assertion, that the

power of conducting is as the densities; but to this rule Priestley himself makes an exception, in regard to oxygen gas, which appears to be a stronger conductor; azotic gas was examined by neither of these philosophers. In hydrogen gas they both found the conducting power very weak, which is no doubt owing to its little density. In oxygen gas they found the sound somewhat stronger than in common air; in the nitrous gas, Perolle found it also somewhat stronger. In carbonic gas, Priestley found the sound stronger, but Perolle weaker, duller, and somewhat lower than in common air; which last circumstance may be considered as agreeable to truth, because the vibrations of a sounding body must be more retarded the denser the surrounding fluid is, or according to its pressure on that body.

304. The velocity of sound was determined with considerable accuracy, and on a great scale, by Cassini and Maraldi, while employed in conducting the trigonometrical survey of France. During the winter of the years 1738 and 1739 these astronomers repeatedly discharged, at night, when the air was calm, and the temperature uniform, a small piece of ordnance, from their station on Mont-Martre, above Paris, and measured the time that elapsed between the flash and the report, as observed from their signal-tower at Mont L'hery, at the distance of about eighteen miles. The mean, of numerous trials, gave 1130 feet for the velocity of the transmission of sound.

305. About this time, Condamine, who was sent with the other academicians to ascertain the length of a degree in Peru, took an opportunity of likewise measuring the celerity of sound. He found this was 1175 feet on the sultry plain of Cayenne, and only 1120 feet on the frozen heights of Quito. It was obvious, therefore, that the rarefaction of the air in those lofty regions had but in a very small degree affected the result. Compared with what had been observed in France, the velocity of the aërial pulses was somewhat diminished at Quito, by the prevailing cold, but was, on the other hand, considerably augmented by the excessive heat and moisture which oppress Cayenne.

306. The distance at which sounds may be heard is much greater than is generally imagined. Dr. Derham informs us, on the authority of S. Averrani, that at the siege of Messina the report of the guns was heard at Augusta and Syracuse, almost 100 Italian miles distant; and he also states that in the naval engagement between the English and Dutch, which took place in 1672, the report of their guns was heard upwards of 200 miles off. Humboldt mentions the reports of volcanoes in South America, heard at the distance of 300 miles; and Dr. Thomson states, on the authority of a friend, that the loud explosions which took place from the volcano in St. Vincent's, were heard distinctly at Demerara: now this is a distance which must considerably exceed 300 miles. On the other hand, again, sound is enfeebled and dissipated sooner in alpine regions: thus, the traveller, roving at some height above a valley, descries, with uncommon clearness, perhaps a huntsman on the brow of the opposite mountain, and, while he watches every flash, yet can he scarcely hear the report of the fowling-piece.

307. Dr. Moll's experiments, which were made with the greatest accuracy in Holland, in the year 1823, are of considerable importance. He ascertained that when sound was transmitted by a clear atmosphere, unaccompanied by the retarding accelerating effects of wind, it travelled at the rate of about 1116 English feet per second.

308. A very valuable and elaborate series of experiments on the velocity of sound has been made at Madras, by Mr. Goldingham. The following table contains the substance of these experiments; and it is curious to remark how the velocity gradually increases towards the middle of the year, and again gradually diminishes. Mr. Goldingham conceives that this regularity would be still greater with the mean of several years' observations.

Months.	Barometer, in inches.	Thermometer, Fahr.	Hygrometer. dry.	Velocity of a sound in a second in feet.
January .	30·124	79·05	6· 2	1101
February ..	30·126	78·84	14·70	1117
March . .	30·072	82·30	15·22	1139
April . .	30·031	85·79	17·23	1145
May . .	29·892	88·11	19·92	1151
June . .	29·907	87·10	24·77	1157
July . .	29·914	86·65	27·85	1164
August .	29·931	85·02	21·54	1163
September	29·963	84·49	18·97	1152
October .	30 058	84·33	18·23	1128
November	30·125	81·35	8·18	1101
December	30·087	79·37	1·43	1099

309. Mr. Goldingham concludes that, for each degree of the thermometer, 1·2 feet may be allowed for the velocity of sound for a second; for each degree of the hygrometer 1·4 feet; and for one tenth of an inch of the barometer 9·2 feet. He concludes that ten feet per second is the difference of the velocity of sound between a calm and in a moderate breeze, and twenty-one feet and a quarter in a second, or 1275 in a minute, is the difference when the wind is in the direction of the motion of sound, or opposed to it.

310. The effects of sound are considerably increased during the night; and this was remarked by the ancients. Humboldt was particularly struck with this fact, when he heard the noise of the great cataracts of the Orinoco; which he describes as three times greater in the night than in the day; though, during the former time, the humming of insects, and the sound of the breeze, is scarcely heard. M. Humboldt attempts to account for this singular phenomenon by the following hypothesis: he supposes that the vibrations of sound are materially retarded by partial undulations in the atmosphere, arising from the sun's heat—so that the waves of sound are divided and redivided, whenever the density

of the medium through which they are propelled is sufficiently altered to form an acoustic mirage.

311. It is well known that solid bodies, in general, are good conductors of sound: thus, any agitation communicated to one end of a beam is readily conveyed to the ear applied to the other end of it.* The motion of a troop of cavalry is said to be perceived at a greater distance by listening with the head in contact with the ground, than by attending to the sound conveyed through the air; and we may frequently observe that some parts of the furniture of a house are a little agitated by the approach of a waggon, before we hear the noise which it immediately occasions. The velocity with which impulses are transmitted by solids is in general considerably greater than that with which they are conveyed by the air: M. Wunsch has ascertained this by direct observations on a series of deal rods closely united together, which appeared to transmit a sound instantaneously, while a sensible interval was required for its passing through the air. It appears, from experiments on the flexure of solid bodies of all kinds, that their elasticity, compared with their density, is much greater than that of the air: thus, the height of the modulus of elasticity of fir-wood is found, by means of such experiments, to be about 9,500,000, whence the velocity of an impulse conveyed through it must be 17,400 feet, or more than three miles in a second. It is obvious, therefore, that in all common experiments such a transmission must appear perfectly instantaneous. There are various methods of ascertaining this velocity from the sounds produced under different circumstances by the substances to be examined, and professor Chladni has in this manner compared the properties of a variety of natural and artificial productions.

312. It does not appear that any direct experiments have been made on the velocity with which an impulse is transmitted through a liquid, although it is well known that liquids are capable of conveying sound without difficulty; professor Robison informs us, for example, that he heard the sound of a bell, transmitted by water, at the distance of 1200 feet. It is, however, says Dr. Young, easy to calculate the velocity with which sound must be propagated in any liquid of which the compressibility has been measured. Mr. Canton has ascertained that the velocity of water is about 22,000 times as great as that of air; it is therefore measured by the height of a column which is in the same proportion to thirty-four feet, that is 750,000 feet, and the velocity corresponding to half this height is 4900 feet in a second. In mercury, also, it appears, from Mr. Canton's experiments, that the velocity must be nearly the same as in water; in spirit of wine a little smaller.

313. It seems probable, from various analogies, that ice has nearly the same faculty of transmission as water itself. If a heavy blow be struck against any part of the frozen surface of a large pool or lake, a person standing at a wide distance from the spot will feel, under foot, a very sensible tremor, at some considerable time before the noise conveyed through the atmosphere has reached his ear. It is asserted that the savage tribes who rove on the icy steppes of Tartary can readily distinguish, from afar, the approach of cavalry, by applying their head close to the frozen surface of the ground.

314. The rate with which the tremor of sound is transmitted through cast-iron, has been ascertained from actual experiment by M. Biot. This philosopher availed himself of the opportunity of the laying of a series of iron pipes, to convey water to Paris; these pipes were about eight feet each in length, connected together with small leaden rings. A bell being suspended within the cavity, at one end of the train of pipes, on striking the clapper at the same instant against the side of the bell, and against the internal surface of the pipe, two distinct sounds were successively heard by an observer stationed at the other extremity. With a train of iron pipes of 2550 feet, or nearly half a mile in length, the interval between the two sounds was found, from a mean of 200 trials, to be 2·79 seconds. But the transmission of sound through the internal column of air would have taken 2·5 seconds: which leaves fifty-nine for the rapidity of the tremor conducted through the cast-iron.. From other more direct trials it was concluded that the exact interval of time, during which the sound performed its passage through the substance of the train of pipes, amounted only to 26·100th parts of a second; being ten or twelve times less than the ordinary transmission through the atmosphere.

315. It is well known that the intensity of sound is diminished by the rarefaction of the medium in which it is produced. We might, therefore, expect the sound excited in hydrogen gas would be more feeble than what it is, under similar circumstances, produced in atmospheric air of a similar specific gravity; but the difference is actually much greater.

316. A small piece of clock-work, by which a bell is struck every half-minute, being placed within the receiver of an air pump, the machine was put in motion, and, after the air had been rarefied 100 times, hydrogen gas was introduced; but the sound, so far from being augmented, was, at least, as feeble as in atmospheric air of that extreme rarity, and decidedly much feebler than when formed in air of its own density, or rarefied ten times.

317. The most remarkable fact is that the admixture of hydrogen gas with atmospheric air has a predominant influence in blunting or stifling sound. If one half of the volume of atmospheric air be extracted, and hydrogen gas be admitted to fill the vacant space, the sound will then become scarcely audible.

318. But the rate of the transmission of sound is found to vary in different gases, after the inverse subduplicate ratio of their densities: thus, through carbonic gas, the communication of the tremor would be about one-third slower than ordinary; but, through the hydrogen gas, which is twelve times more elastic than common air, the flight would very nearly exceed three and a half times the usual rapidity. An admixture of this gas with the atmosphere would, therefore, greatly accelerate the transmission of sound.

319. It may be worth while observing that Mr.

Cooper has ascertained that, if hydrogen gas be breathed for a few moments, it has the curious effect of changing the voice. The effect is observed on the person speaking, immediately after leaving the vessel of hydrogen, but it soon goes off. No instance has yet occurred in which this effect on the voice has not been produced by the hydrogen.

320. By a reference to the preceding facts, it will be evident that there is scarcely any body that does not possess the power of conducting sound by the vibration of its particles, and our space will only permit of a brief notice of the experiments by Mr. Wheatstone, tending to illustrate the phenomena of polarisation.

321. 'I connected,' says he, 'a tuning-fork with one extremity of a straight conducting rod, the other end of which communicated with a sounding-board: on causing the tuning-fork to sound, the vibrations were powerfully transmitted, but, in gradually bending the rod, the sound progressively decreased, and was scarcely perceptible when the angle was a right one. As the angle was made more acute the phenomena were produced in an inverted order: the intensity gradually increased as it had before diminished; and, when the two parts were nearly parallel, it became as powerful as in the rectilineal transmission. By multiplying the right angles in a rod, the transmission of the vibration may be completely stopped.'

322. In these experiments the axis of the oscillations of the tuning-fork should be perpendicular to the plane of the moveable angles: for, if they are parallel, they will still be transmitted. Mr. Wheatstone gives the following explanation to prove this:—'I placed a tuning-fork perpendicularly on the side of a rectilineal rod. The vibrations were therefore communicated at right angles; when the axis of oscillations of the fork coincided with the rod the intensity of the transmitted vibrations was at its maximum. In proportion as the axis deviated from parallelism the intensity diminished; and, when it became perpendicular, the intensity was a minimum.' The phenomena of polarisation may be observed in many chorded instruments. The chords of the harp are attached to a conductor which has the same direction as the sounding-board; if any chord be altered from its quiescent position, so that its axis of oscillation shall be parallel with the bridge or conductor, its tone will be full; but if the oscillations be excited, so that their axes shall be at right angles with the conductor, the tone will be feeble.

323. In many cases the reflection of sound becomes extremely inconvenient, by the new direction that is given to the voice in large rooms, and a variety of architectural arrangements have been employed to remedy this effect; but there is another circumstance connected with the transmission of sound in apartments, which should not escape our attention: namely, that the aërial pulses are facilitated or retarded in their progress by the artificial currents that arise from the process of ventilation.

324. The methods by which it is proposed by Mr. Matthews to counteract this acoustical defect are as follows:—where there is room a circle should be preferred, or at least a form, as nearly so as can be; this, however, is not positively essential. The ceiling should be one entire inverted dome, or obtuse cone, with the base upwards, extending in that direction to within about ten feet of the walls of the building. From the highest part, it should again descend to the wall, and nearly as low as the heads of the occupants of the back seats. The lowest point of the ceiling, if a circle, to be in the centre not more than fifteen or sixteen feet from the ground. The station of the speaker should be under the lowest point of the cone, with a hollow sounding-board about a foot above his head, and so constructed as to convey a clear sound behind him. A constant breeze of air will be made to pour forth in every direction, from holes in its sides, until it reaches the highest part of the ceiling. From thence it cannot return; but will be drawn off by means of ventilators that will not admit cold air: but will leave the vacuous space to be supplied from the sounding-board only. In courts of justice, and other places where the voice will have occasionally to proceed from different parts of the building, it can be made to proceed from the place where a person is speaking; and the moment he has done, to proceed from an opposite place in which another person also speaks, by opening and shutting dampers provided for this purpose. This air in winter can be heated to the degree required. Thus, the sound, instead of having occasion to cross the ascending evaporation, and be opposed to the current of air, which now rushes forward to supply its place, will pass along with the current, and a moderately low-toned voice will be distinctly heard in every part of a large room.

325. Dr. Wollaston has lately discovered the very singular fact, that there are many persons who never felt any defect in their hearing, and who yet cannot hear certain sounds, which others perceive distinctly.

326. It is well known that persons affected with slight deafness hear sharp sounds much better than those which are grave and low. They distinguish the voices of women and children, from their acuteness, much better than the lower tones of men's voices. This fact is acted upon practically, as it may be remarked that those accustomed to speak to deaf people use a shriller tone of voice, rather than merely a louder tone than common.

327. This partial deafness may be artificially produced, by shutting the mouth and nose, and exhausting the air in the Eustachian tube, by a forcible attempt to take breath by expanding the chest. When this is carefully done, so that the exhaustion of the air behind the drum of the ear is as complete as possible, the external air is felt strongly, and even painfully, pressing on the drum; and the ear becomes insensible to low sounds, though shrill sounds are as readily perceived as before.

328. After the ear is brought into this state, it will remain so for some time, without continuing the painful effort to take breath, and even without stopping the breath; for, by suddenly discontinuing the effort, the end of the tube will close like a valve, and prevent the air from get-

ting into the drum. The act of swallowing will open the closed tube, and restore the air to its wonted feeling.

329. When the ear is thus exhausted, if we attempt to listen to the sound of a carriage passing in the street, the rumbling noise cannot be heard, though the rattle of a chain or loose screw remains as easily heard as before. At a concert the experiment has a singular effect: as none of the sharper sounds are lost, and the great mass of the louder sounds are suppressed, the shriller ones are consequently so much the more distinctly heard, even to the rattling of the keys of a bad instrument, or the scraping of catgut unskilfully touched.

330. Dr. Robison found, by the most distinct experiments, that any noise whatever, will have the effect of producing a musical note if repeated with due frequency, not less than thirty or forty times in a second. Nothing surely can have less pretension to the name of a musical sound than the solitary snap which a quill makes when drawn from one tooth of a comb to another: but when the quill is held to the teeth of the wheel, whirling at such a rate that 720 teeth pass under it in a second, the sound of G in alt. is heard most distinctly; and if the weight of the wheel's motion be varied in any proportion, the noise made by the quill is mixed, in the most distinct manner, with the musical note corresponding to the frequency of the snaps. The kind of the original noise determines the kind of the continuous sound produced by it, making it harsh and unpleasant, or smooth and harmonious, according as the original noise is abrupt or gradual: but even the most abrupt noise produces a tolerably smooth sound when sufficiently frequent. Nothing can be more abrupt than the snap just now mentioned; yet the G produced by it has the smoothness of a bird's chirrup.

INDEX.

PNEUMONIA. From πνευμα, breath. Pneumonitis: peripneumonia; peripneumonia vera. Inflammation of the lungs. A genus of disease in the class pyrexiæ, and order phlegmasiæ, of Cullen; characterised by pyrexia, difficult respiration, cough, and a sense of weight and pain in the thorax. The species, according to the above nosologist, are, 1. Peripneumonia. The pulse not always hard, but sometimes soft: an obtuse pain in the breast: the respiration always difficult; sometimes the patient cannot breathe, unless in an upright posture; the face swelled, and of a livid color; the cough for the most part with expectoration, frequently bloody. 2. Pleuritis. The pulse hard: a pungent pain in one side; aggravated during the time of inspiration; an uneasiness when lying on one side: a very painful cough, dry in the beginning of the disease, afterwards with expectoration, and frequently bloody. See MEDICINE, Index.

PO, a large and celebrated river of Italy, anciently called Eridanus and Padus, which rises from Mount Viso, in Piedmont, seven miles north of Chateau Dauphin, on the borders of the late province of Dauphiny; crosses Saluzzo, runs through Piedmont, Montferrat, Milan, Mantua, Modena, and Ferrara; where it begins to divide at Ficheruolo, and at last falls into the Adriatic by four principal mouths. In its course it passes Ville Franca, Carmagnola, Carignano, Moncalier, Turin, Verrua, Brema, Valencia, Placentia, Cremona, Viadana, St. Benedict, Ferrara, Ariano, Comacchio, &c. It receives the waters of many Alpine rivers, which make it often overflow its banks. The principal tributary streams are the Dora Riparia, the Dora Baltea, the Stura, the Orco, the Sesia, the Tanaro, the Ticino, the Adda, the Olona, the Oglio, the Mincio, the Crostolo, and the Panaro.

POA, meadow-grass: a genus of the digynia order, and pentandria class of plants; natural order fourth, gramina: CAL. is bivalved and multiflorous: the spicula or partial spike is ovate, with the valvules scabrious and a little sharp, or thin on the margin. There are twenty species; most of them grasses, and very agreeable food for cattle. P. aquatica, water reed-grass, grows in marshes. The cattle will frequently go so deep as to endanger their lives for it. It is the largest of the British grasses, growing to the height of five or six feet. The leaves are smooth, and half an inch wide or more. The panicle is eight or ten inches long, greatly branched, and decked with numerous spiculæ: these are of a reddish brown color intermixed with green, of a compressed lanceolate form, imbricated with about six flowers for the most part, but varying from five to ten.

POACH, *v. a.* & *v. n.* } Fr. *pocher*, *poche*
POACH'ER, *n. s.* } (a pouch or pocket). To boil or parboil eggs by throwing them out of the shell into water, 'by which they are formed into globules or pouches.'—Thomson. Hence to parboil an undertaking, i. e. begin without completing it; see the extracts from Bacon: to steal, i. e. carry off, game (in a bag or pouch); plunder by stealth: a poacher is one who steals game.

The yolks of eggs are so well prepared for nourishment, that, so they be *poached* or rare boiled, they need no other preparation. *Bacon.*

Of latter times, they have rather *poached* and offered at a number of enterprizes, than maintained any constantly. *Id.*

The flowk, sole, and plaice, follow the tide up into the fresh rivers, where, at low water, the country people *poach* them with an instrument somewhat like the salmon spear. *Carew.*

In the schools
They *poach* for sense, and hunt for idle rules.
Oldham.

You old *poachers* have such a way with you, that all at once the business is done. *More's Foundling.*

So shameless, so abandoned are their ways,
They *poach* Parnassus, and lay claim for praise.
Garth.

POACH', *v. n.* } Probably from Podge,
POACH'INESS, *n. s.* } a puddle. To be or be-
POACH'Y, *adj.* } come damp: poachiness is, marshiness; dampness: poachy, damp; marshy.

Chalky and clay lands burn in hot weather, chap in summer, and *poach* in winter. *Mortimer.*

What uplands you design for mowing, shut up the beginning of February; but marsh lands lay not up till April, except your marshes be very *poachy*.
Id. Husbandry.

POCK, *n. s.* } Sax. þoc, from Pox, which
POCKHOLES, } see. A pustule raised by the
POCKY, *adj.* } small-pox, or any similar disorder: pockholes, the holes left by pock.

Are these but warts and *pockholes* in the face
O' the' earth? *Donne.*

POCK'ET, *n. s.* & *v. a.* } Sax. þocca; Fr.
POCK'ET-BOOK, *n. s.* } *pochette*. The small
POCK'ET-GLASS. } bag or pouch inserted into clothes; a certain quantity of hops: to put into the pocket, taking *up* after it, occasionally: a pocket-book and pocket-glass, mean respectively a book and glass carried for convenience in the pocket.

Here's a letter
Found in the *pocket* of the slain Roderigo.
Shakspeare.

If thy *pocket* were enriched with any other injuries but these, I am a villain; and yet you will stand to it, you will not *pocket up* wrongs. *Id.*

As he was seldom without medals in his *pocket*, he would often shew us the same face on an old coin, that we saw in the statue. *Addison on Medals.*

Whilst one hand exalts the blow,
And on the earth extends the foe;
T' other would take it wondrous ill,
If in your *pocket* he lay still. *Prior.*

He lays his claim
To half the profit, half the fame,
And helps to *pocket up* the game. *Id.*
The world's a farce, an empty show,
Powder, and *pocketglass*, and beaux. *Id.*

Licinius let out the offals of his meat to interest, and kept a register of such debtors in his *pocketbook*.
Arbuthnot.

Blessed paper-credit!
Gold, imp'd with this, can compass hardest things,
Can *pocket* states, or fetch or carry kings. *Pope.*
And vanity with *pocketglass*,
And impudence with front of brass.
Swift's Miscellanies.

Note down the matters of doubt in some *pocket-book*, and take the first opportunity to get them resolved. *Watts.*

My vanity was highly gratified by the reception I met with from the public; and besides, I *pocketed*, all expenses deducted, nearly twenty pounds.
Burns.

POCOCK (Sir George), K. B., a British admiral, son of the Rev. Thomas Pocock, F.R.S., was born March 6th, 1706. In 1718 he commenced seaman under his uncle, Sir George Byng, and served in the memorable victory that year off Sicily; and afterwards rose through the various naval ranks with honor. In February, 1754, he had a command in the East Indies; and, in 1758, was admiral-in-chief, when the British fleet, with inferior force, gained three signal victories over the French, for which the East India Company voted him thanks in 1759. After several other hard fought, but successful, battles, he returned with glory to Britain in 1760. In 1761 he immortalised his name at the capture of Havannah. He died in London, April 3rd, 1792, much esteemed, aged eighty-seven.

POCOCKE (Edward), D. D., one of the most learned men of his day, was the eldest son of the Rev. Edward Pococke; and born at Oxford in 1604. In 1628 he was admitted fellow of his college, when he had prepared an edition of the Second Epistle of St. Peter, the Second and Third of St. John, and that of St. Jude, in Syriac and Greek, with a Latin Translation and Notes. In 1629 he was ordained priest, and appointed chaplain to the English at Aleppo, where he continued five or six years; and distinguished himself by his fortitude and humanity during the plague. Returning to England, he was in 1636 appointed reader of the Arabic lectures, founded by archbishop Laud. In 1637 he went back to Constantinople, where he procured many valuable MSS. He embarked in 1640, and, taking Paris in his way, visited Gabriel Sionita, the famous Maronite, and Hugh Grotius. In 1643 he was made rector of Childrey in Berks; and about 1646 married the daughter of Thomas Burdett, Esq. In 1647 he obtained the restitution of the salary of his Arabic lecture. In 1648 king Charles I., then prisoner in the Isle of Wight, nominated him professor of Hebrew, and canon of Christ Church; but in 1650 he was ejected for refusing to take the engagement; but upon the petition of several governors of houses, &c., he was suffered to enjoy both. He had previously published his Specimen Historiæ Arabum; now appeared his Porta Mosis: soon after the English Polyglot edition of the Bible, to which he had largely contributed, and Eutychius's Annals, with a Latin version. At the Restoration he was restored to his canonry, and received the degree of D. D. He then published his Arabic version of Grotius on the Truth of the Christian Religion; and an Arabic poem entitled Lamiato'l Ajam, with a Latin translation and notes. Soon after appeared Gregory Abul-Pharajius's Historia Dynastiarum. In 1674 he published an Arabic version of the chief parts of the English Liturgy; and, a few years after, his Commentary on the Prophecies of Micah, Malachi, Hosea, and Joel. He died in 1691, after having been long esteemed the first person in Europe for eastern learning; and was no less eminent for modesty, humility, and all the Christian virtues. His theological works were republished at London in 1740, in 2 vols. folio.

POCOCKE (Richard), LL. D., a relation of the above, born in 1704, at Southampton, where he was educated. He afterwards studied at Corpus Christi College, Oxford, where he graduated in 1731 and 1733. In 1737 he began his Travels into the east, and returned in 1742. In 1743 he published a description of the East, Vol. I. containing observations on Egypt. In 1745 he published Vol. II., on Palestine, Syria, Mesopotamia, Cyprus, and Candia; which he dedicated to the Earl of Chesterfield, then lord lieutenant of Ireland, whom he attended to Ireland, and was made archdeacon of Dublin. In March 1756 he was appointed bishop of Ossory, by the duke of Devonshire, and in 1765 bishop of Meath; but died in September 1765, of an apoplectic fit.

POC'ULENT, *adj.* Lat. *poculum.* Fit for drink.

Some of these herbs, which are not esculent, are notwithstanding *poculent;* as hops and broom.
Bacon.

POD, *n. s.* Dutch *bode*, *boede*, a little house.—Skinner. But the Sax. *codd* and Goth. *kodde*, Swed. *kudde*, and Welsh *cod*, are synonymes of this word, which affords an instance of the striking intermutations of *p* and *c* in the northern language. A husk; capsule; seed vessel.

To raise tulips, save the seeds which are ripe, when the *pods* begin to open at the top, which cut off with the stalks from the root, and keep the *pods* upright, that the seeds do not fall out. *Mortimer.*

PODAG'RICAL, *adj.* Lat. *podagra;* Gr. ποδαγρικὸς, ποδάγρα. Afflicted with the gout.

From a magnetical activity must be made out, that a loadstone, held in the hand of one that is *podagrical*, doth either cure or give great ease in the gout. *Browne's Vulgar Errours.*

PODAGRA. From πους, the foot, and αγρα, a taking, or seizure. Febris podagrica. Arthritis; dolor podagricus; the gout. A genus of disease in the class pyrexiæ and order phlegmasiæ, of Cullen; known by pyrexia, pain in the joints, chiefly of the great toe, or at any rate of the hands and feet, returning at intervals: previous to the attack, the functions of the stomach are commonly disturbed. The species are, 1 Podagra regularis. Arthritis podagra; arthritis rachialgica; arthritis æstiva, of Sauvages. The regular gout. 2. Podagra atonica. Arthritis melancholica; hiemalis; chlorotica; and asthmatica, of Sauvages. The atonic gout. 3. Podagra retrograda. The retrocedent. 4. Podagra aberrans. Misplaced or wandering gout. See MEDICINE, Index.

PODALIRIUS, son of Æsculapius and Epione, was one of the pupils of the Centaur Chiron, under whom he made himself such a master of medicine that during the Trojan war the Greeks invited him to their camp to stop a pestilence which had baffled the skill of all their physicians. Some say, however, that he went to the Trojan war, not as a physician but as a warrior, with his brother Machaon, in thirty ships.

with soldiers from Œchalia, Ithome, and Trica. At his return Podalirius was shipwrecked on the coast of Caria, where he cured of the epilepsy a daughter of the king. He fixed his habitation there; and built two towns, one of which he called Syrna, after his wife. The Carians, on his death, built him a temple, and paid him divine honors.

PODGORZA, a manufacturing town in Austrian Galicia, on the Vistula, opposite to Cracow. Its trade was formerly considerable; but, after this part of Poland became subject to Austria, it declined, though the government made it one of the principal depôts of the salt from the mines of Wieliczka. Population 4000.

PODLACHIA, one of the eight palatinates of the present kingdom of Poland, bounded on the north and east by the Bug, on the south by Lublin, and on the west by the Vistula. Its area is 5520 square miles; entirely level, and with a number of marshy tracts and small streams; the only large rivers are those which are on its boundaries. Population 438,000. The chief town is Siedlce. While we now write (May 1831) this province has become the theatre of a new revolution, which, commencing at Warsaw, promises fair to liberate the whole of Russian Poland from the dominion of that power.

PODLUZACS, a tribe of Croats, settled in a district in the southern extremity of Moravia. Their numbers have considerably increased of late, and, though surrounded with a German population, they preserve their ancient dress, language, and manners.

PODOLIA, an extensive government of European Russia, lying adjacent to the province of Buckowine in Austria. Its area is 20,400 square miles; adjoining the Carpathians, and having a considerably elevated surface; so that vines do not thrive here, but corn, pasturage, and cattle abound. The inhabitants are not industrious; the surface of the soil being barely scratched by the plough, and every process connected with the arts conducted in the most rude manner. The forests afford for export, timber, pitch, tar, rosin, potash, and Polish cochineal. The other products are flax, hemp, salt-petre, tobacco, and bees-wax. The chief rivers, the Dniester and the Bog, facilitate the communication with the Black Sea; but the commerce is very limited. Population 1,330,000.

Podolia, an independent duchy in the middle ages, was conquered by the Poles, and long incorporated with the Ukraine. The capital is Kaminiec, or, as it is called by the Russians, Kaminetz-Podolsk, a place well known in the seventeenth century, for the noble opposition which it make to the Turks.

PODOPHYLLUM, duck's foot, or May apple, in botany, a genus of the monogynia order, and polyandria class of plants; natural order twenty-seventh, rhæadeæ: COR. nine petals: CAL. triphyllous: BERRY unilocular, crowned with the stigma.

PODURA, or spring tail, in entomology, a genus of insects of the order of aptera. They have six feet formed for running; two eyes composed of eight facets; a tail forked, bent under the body, elastic, and acting like a spring; the antennæ are long and setaceous. 'This genus is distinguished,' says Barbut, 'into several species. Some inhabit still waters, leaping and walking with ease on the surface of that element. They assemble in troops in the morning, on the banks of pools, fish-ponds, and reservoirs; others are found in damp places, under leaves, bark, and stones; others among heaps of rotten wood, mushrooms, and in melon beds. In Lapland they are seen running upon the snow, but when it begins to melt they perish. The podura, by its elasticity, eludes the eager grasp of the naturalist. Its hard forky tail is a kind of spring, by means of which the body of the animal is thrown up into the air.' P. villosa is one of the largest species found in Britain, and appears to be of a brown sooty color, though it is really of a yellow brown, interspersed throughout with black-colored spots and streaks. The head and thorax are hairy, and stick to the fingers when touched: the abdomen is smooth: the antennæ, consisting of four articulations, are as long as two thirds of the body. It is commonly found under stones.

POE-BIRD, in ornithology, is an inhabitant of some of the South Sea Islands, where it is held in great esteem and veneration by the natives. It goes by the name of kogo in New Zealand; but it is better known by that of poë-bird. It is somewhat less than our blackbird. The feathers are of a fine mazarine blue, except those of its neck, which are of a most beautiful silver gray, and two or three short white ones which are on the pinion joint of the wing. Under its throat hang two little tufts of curled snow-white feathers, called its poies (the Otaheitean word for ear-rings); which occasioned the name of poë-bird. It is remarkable for the sweetness of its note, as well as the beauty of its plumage. Its flesh is also delicate food.

PŒCILE, a famous portico at Athens, which received its name from the variety (ποικιλος), of paintings which it contained. Zeno kept his school there; and there also the stoics received their lessons, whence their name, from ϛοα, a porch. It was adorned with historical pictures of the siege and destruction of Troy, battle of Marathon, &c.

PO'EM, *n. s.*
Po'ESY,
Po'ET,
Po'ETASTER,
Po'ETESS,
POET'IC, *adj.*
POET'ICAL,
POET'ICALLY, *adv.*
Po'ETIZE, *v. n.*
Po'ETRESS, *n. s.*
Po'ETRY.

Fr. *poesie, poete, poetiser*: Lat. *poema, poesis, poeta*; Gr. ποιημα, à ποιεω (facio) See below. A metrical composition: poesy and poetry mean the art of making or producing such a composition: Shakspeare uses poesy for a short conceit, or legend, on a ring: a poet is, a maker or author of poetry; one who writes with measure: poetaster, a low dabbler in poetry: poetess and poetress, a female poet: poetic and poetical, expressed in, or partaking the nature of, poetry: poetically following this sense: to poetize is, to compose poetry; write as, or like, a poet.

Most peerless *poetress*,
The true Pandora of all heavenly graces. *Spenser.*

Musick and *poesy* used to quicken you.
Shakspeare.

A paltry ring, whose *poesy* was
For all the world like cutler's *poetry*
Upon a knife: Love me, and leave me not. *Id.*

The *poet's* eye in a fine frenzy rolling,
Doth glance from heaven to earth, from earth to heaven;
And, as imagination bodies forth
The forms of things unknown, the *poet's* pen
Turns them to shape, and gives to every thing
A local habitation and a name. *Id.*

—I do not know what *poetical* is,
—The truest *poetry* is most feigning. *Id.*

The many rocks, in the passage between Greece and the bottom of Pontus, are *poetically* converted into those fiery bulls. *Raleigh.*

There is an hymn, for they have excellent *poesy;* the subject is always the praises of Adam, Noah, and Abraham, concluding ever with a thanksgiving for the nativity of our Saviour. *Bacon.*

I versify the truth, not *poetize*. *Donne.*

A *poem* is the work of the *poet;* *poesy* is his skill or craft of making; the very fiction itself, the reason or form of the work. *Ben Jonson.*

Let no *poetaster* command or intreat
Another, extempore verses to make. *Id.*

The lady Anne of Bretaigne, passing through the presence in the court of France, and espying Chartier, a famous *poet*, fast asleep, kissing him, said, We must honour the mouth whence so many golden *poems* have proceeded. *Peacham on Poetry.*

Virgil, speaking of Turnus and his great strength, thus *poetizes*. *Hakewill.*

Strike the best invention dead,
Till baffled *poetry* hangs down the head.
Cleaveland.

Ah! wretched we, *poets* of earth, but thou
Wert living the same *poet* that thou'rt now,
While angels sing to thee their aires divine,
And join in an applause so great as thine.
Cowley.

'Tis not vain or fabulous,
What the sage *poets*, taught by the heavenly muse,
Story'd of old in high immortal verse,
Of dire chimeras and enchanted isles. *Milton.*

The moral of that *poetical* fiction, that the uppermost link of all the series of subordinate causes is fastened to Jupiter's chair, signifies that almighty God governs and directs subordinate causes and effects. *Hale.*

They apprehend a veritable history in an emblem or piece of christian *poesy*.
Browne's Vulgar Errours.

Begin not as the old *poetaster* did,
Troy's famous war, and Priam's fate I sing.
Roscommon.

With courage guard, and beauty warm our age,
And lovers fill with like *poetick* rage. *Waller.*

The utmost that can be achieved, or I think pretended, by any rules in the art of *poetry*, is but to hinder some men from being very ill *poets*, but not to make any man a very good one. *Sir W. Temple.*

To you the promised *poem* I will pay. *Dryden.*

How far have we
Prophaned thy heavenly gift of *poesy?*
Made prostitute and profligate the muse,
Whose harmony was first ordained above
For tongues of angels? *Id.*

A *poet* is a maker, as the word signifies; and he who cannot make, that is invent, hath his name for nothing. *Id.*

Neither is it enough to give his author's sense in good English, in *poetical* expressions, and in musical numbers. *Id.*

The criticks have concluded that the manners of the heroes are *poetically* good, if of a piece. *Id.*

Although in *poetry* it be necessary that the unities of time, place, and action should be explained, there is still something that gives a greatness of mind to the reader, which few of the criticks have considered.
Addison's Spectator.

Horace hath exposed those trifling *poetasters* that spend themselves in glaring descriptions, and sewing here and there some cloth of gold on their sackcloth.
Felton.

The muse saw it upward rise,
Though marked by none but quick *poetick* eyes.
Pope.

I alone can inspire the *poetical* crowd. *Swift.*

These are the gloomy companions of a disturbed imagination, the melancholy madness of *poetry* without the inspiration. *Junius.*

The gentleman deals in fiction, and naturally appeals to the evidence of the *poets*. *Id.*

There was a predominant fancy and spirit of his own infused, superior to what some draw off from the ancients, or from *poesies*, here and there culled out of the moderns, by a painful industry and servile imitation. *Johnson.*

The death of the king furnished a general subject for a *poetical* contest, in which Mr. Savage engaged, and is allowed to have carried the prize of honour from his competitors. *Id.*

They best can judge a *poet's* worth,
Who oft themselves have known
The pangs of a *poetic* birth,
By labours of their own. *Cowper.*

POENI, a name given by the Romans to the Carthaginians; a corruption of the word Phœni,

POERSON (Charles Francis), an eminent French painter, born at Paris in 1653. He excelled in portraits and history, and became director of the French academy at Rome. He died in 1725.

PŒSTUM, PÆSTUM, or POSIDONIA, an ancient city of Græcia Magna, now part of Naples. See PÆSTUM. It was founded by one of those colonies from Greece who early established themselves in Italy; and it flourished before the foundation of Rome itself. It was destroyed by the Goths on the decline of the Roman empire. Since that time it has lain in ruins, which in 1755 were accidentally discovered, and ordered by the king of Naples to be cleared out; upon which Pœstum arose from the obscurity in which it had continued for seven centuries, covered with rubbish, and little noticed either by neighbours or travellers. It appears, at present, to have been of an oblong figure, two miles and a half in circumference, and having four gates opposite to each other. The chief antiquities are a theatre, amphitheatre, and three temples, with relics of aqueducts, &c.

POETRY.

Poetry, Gr. ποιητρια, of ποιεω (I make), is a term of art, more correctly expressive than most others which have been handed down to us from the ancients. It is, indeed, the art, the power to *make* or create more than any other human pursuit, and while it may, perhaps, be generally defined as the language of passion and imagination, this clearly rather describes it in its effect than in its origin or essential nature; as the dews rising from a collection of herbage in spring seem to have originated in the vegetable mass which they have only visited and fertilised. The poetic forms of language, we mean, are obviously distinguishable from the poetry of thought. For while both may combine, and in their union afford the only perfect exhibition of the power of each, as in our unequalled Milton, the latter is not to be denied to some of our distinguished prose writers, as, for instance, Milton's great contemporary Jeremy Taylor.

We must therefore reject, as wholly heretical, the doctrine of Aristotle that poetry is but *τεχνη μιμητικη*, an imitative art. It has in charge a much higher task. The utterance of some of the deepest feelings and most original thoughts of the human mind belongs to poetry. Lord Bacon has happily described its chief office when he says, 'Poetry doth raise and erect the mind by submitting the theory of things to the desires of the mind.' It submits the whole outward world to the plastic hand of the true poet; to this he adds the thousand forms of an imaginary world, and concentrates, combines, and models, the whole by a power assuredly not of any imitative kind; as certainly not to be learnt or derived from his fellow man; and as clearly not transferrable by him to another. The father of the modern philosophy has exactly indicated the true tendency of real poetry, when he speaks of it as *elevating* the mind by the submission of its materials to the *desires*. Its whole business is to enrich and magnify and dignify the literal facts and images with which it works: a Miltonic Satan is almost dangerously grand and awe-inspiring; the mad Lear of a Shakspeare has nothing mean nor disgusting in his madness. And poetry, we are persuaded, can only captivate when it addresses our hopes rather than our fears; when it stirs up and administers to our 'desires' as opposed to our aversions. It was the child, perhaps, of the praise of God—(It is well established that the dramatic poetry of all the western civilised nations, see our article Drama, had its origin in hymns sung to the honor of Bacchus)—it expressed gratitude and burst into strains of extatic joy before an infinitely great and good Being, the very thought of whom would be accompanied with the desire and the hope of propitiating him. Under every form of religion this desire has obtained and been loudly expressed; the early poetry of all nations abounds with the strongest manifestations of it. Such poetry would naturally appropriate all that is splendid and glowing, serene and beautiful in the external creation.

If, as it has been well said upon this point, 'there is great beauty in the use of *familiar words*, skilfully applied and combined, and that some of the most affecting and sublime passages in our great poets are constituted of materials of the cheapest quality: they are no longer cheap or ordinary in the place into which we find them transplanted; and in giving to them this new value lies the profound secret of the poetical artist. It is by arrangement, and disposition, and combination, that he draws out the latent powers of language, and, by the contact of new affinities, mysteriously varies its nature, and endows it with new properties. But, if words or phrases of vulgar origin still retain in their new situation the savour of their plebeian stock, they retain also their full disqualification for the post and preferment to which they are advanced. Poets, such as Shakspeare and Milton, have each been the fountain of honor, from which sometimes a language of the lowest birth has derived a nobility of rank. Something doubtless is to be ascribed to the prerogative of transcendant excellence, and something to prescription, and the reconciling effect of time and usage; but the magic really resides in that fine and discriminative tact, which at once detects the capabilities of homely expressions, and snatches them warm and breathing from the intercourse of common life, to impart their freshness and stamina, and to take on themselves another nature.'

Another natural source of poetry was love; or the mutual desire of the sexes, connected with this passion, to please and to be pleased; or to find and to exhibit personal attractions. Hence the impassioned but still tender, and touching, and simple power of the ancient lyric poetry,

> Warm from the heart and faithful to its fires.

The thousand causes of separation between lovers are often commemorated in its odes; while the final and desolating separation of death gave rise to the shorter dirge; then to the elegy. Epic and moral poetry would first express the detestation of the wise and good against the corruptions and corrupters of mankind: it was at first vehement and severe; then more coolly preceptive. Afterwards followed the adaptation of poetry to war, and, as the stimulant of patriotism; its association with music; its application to the purposes of personal satire.

We believe the actual history of this almost divine art will be found to correspond with these general views. Whether we look, however, at sacred or profane poetry, what shall we find like a mere imitative art in the first masters? What did David or Solomon imitate in their divine poems? A man, who is really joyful or afflicted, cannot be said to imitate joy or affliction. The lyric verses of Alcæus, Alcman, and Ibycus, the hymns of Callimachus, the elegy of Moschus on the death of Bion, are all strongly depicted poetry, at once from the earliest and purest sources: but Alcæus was no imitator of

love, Callimachus no hypocrite in his religious awe and admiration, Moschus no imitator of grief at the loss of an amiable friend. Aristotle himself wrote a poetical elegy on the death of a man whom he had loved; but it would be difficult to say what he imitated in it. 'O beautiful Virtue,' he exclaims, 'it was always an envied happiness in Greece even to die, and to suffer the most painful, the most afflicting evils: such are the immortal fruits which thou raisest in our minds; fruits more precious than gold, more sweet than the love of parents and soft repose; for thee Hercules the son of Jove, and the twins of Leda, sustained many labors, and by their illustrious actions sought thy favor; for love of thee Achilles and Ajax descended to the mansion of Pluto; and, through a zeal for thy charms, the prince of Atarnea also was deprived of the sun's light: therefore shall the Muses, daughters of Memory, render him immortal for his glorious deeds, whenever they sing of hospitality, and the honors due to a constant friendship.'

It has however been asserted, in modern times, that descriptive poetry, and descriptive music, as they are called, are strict imitations; but, not to insist that mere description is the meanest part of both arts, if indeed it belongs to them at all, it is clear that words and sounds have no necessary resemblance to visible objects: and what is an imitation, but a resemblance of some other thing? Besides, no unprejudiced hearer will say that he finds the smallest traces of imitation in the numerous fugues, counterfugues, and divisions, which disgrace rather than adorn the modern music: even sounds themselves are imperfectly imitated by harmony, and, if we sometimes hear the murmuring of a brook, or the chirping of birds in a concert, we are generally apprised beforehand of the passages where we may expect them. Some eminent musicians, indeed, have been absurd enough to think of imitating laughter and other noises; but, if they had succeeded, they could not have made amends for their want of taste in attempting it; for such ridiculous imitations must necessarily destroy the spirit and dignity of the finest poems, which they ought to illustrate by a graceful and natural melody. It seems to us that as those parts of poetry, music, and painting, which relate to the passions, affect by sympathy; so those, which are merely descriptive, act by a kind of substitution; that is, by raising in our minds affections, or sentiments, analogous to those which arise in us when the respective objects in nature are presented to our senses.

A late able writer thus compares the history and claims of the different fine arts:—'Poetry is the oldest, the rarest, and the most excellent of the fine arts. It was the first fixed form of language; the earliest perpetuation of thought; it existed before prose in history, before music in melody, and before painting in description. Anterior to the discovery of letters, it was employed to communicate the lessons of wisdom, and to celebrate the achievements of valor; music was invented to accompany, and painting to illustrate it. We have said that poetry is the rarest of the fine arts, and we may appeal to almost any collection of specimens of poetry in proof of our assertion. Thus Southey's specimens exhibit pieces of more than 200 writers, among whom there are not twenty whose compositions rise to the dignity of poetry; and of these, perhaps, not more than seven will be known to posterity by their works. The art of constructing easy, elegant, and even spirited verse, may be acquired by any mind of moderate capacity and liberal knowledge; but to frame the lay that quickens the pulse, flushes the cheek, warms the heart, and expands the soul of the reader, playing upon his passions as upon a lyre, and making him feel as if he were conversing with a spirit—this is the art of nature herself, invariably and perpetually pleasing, by a secret undefinable charm, that lives through all her works.

'The power of being a poet is a power from heaven: wherein it consists we know not; but this we do know, that there never existed a poet of the highest order,—and we acknowledge none other to be truly poets,—who either learned his art of one, or taught it to another. It is true that the poet communicates to the bosom of his reader that flame that burns in his own, but the bosom thus enkindled cannot communicate the fire to a third; in the mind of the bard alone that energy of thought which gives birth to poetry is an active principle, in all others it is only a passive feeling. This theory is confirmed by the fact that, though poetical genius is wonderfully aided in its development and display by learning and taste, yet among the rudest people it is found, like native gold and diamonds, as pure and perfect in substance, though encrusted in baser matter, as among the most enlightened nations; but it is seldomer seen, and in smaller quantities, not being laboriously dug from the mine, purified in the furnace, and polished on the wheel, but only occasionally washed from the mountains, or accidentally discovered among the sands. It is another curious fact that, with the exception of ancient Rome, the noblest works of the muse have been produced in the middle age between gross barbarism and voluptuous refinement, when the human mind yet possessed strong traits of its characteristic grandeur and simplicity, but, divested of its native fierceness, and chastened by courtesy, felt itself rising in knowledge, worth, and intellectual superiority. The poems of Homer existed long before Greece arrived at its zenith of glory. Dante, Petrarch, and Ariosto, in Italy; Camoens, in Portugal; and Shakspeare, Spenser, and Milton, in England, flourished in ages far inferior to the present in luxury of manners, and refinement of taste: yet their poems, in the respective countries, have not since been equalled, and will probably never be surpassed by their successors.

Poetry is also the most excellent of the fine arts. It transcends all other literary composition in harmony, beauty, and splendor of style, imagery, and thought, as well as the permanency and vivacity of its influence on the mind; for its language and sentiments are so intimately connected that they are remembered together: they are soul and body, that cannot be separated without death,—a death, in which the dissolution of the one causes the disappearance of the

other; if the spell of the words be broken, the charm of the idea is lost. Poetry excels music in the passion and pathos of its movements; for its cadences are ever united with distinct feelings and emotions of the soul, and their association is always clear and comprehensible; whereas music, except when it is allied with poetry, or appeals to memory, is simply a sensual and vague, though innocent, delight, conveying no improvement to the heart, and leaving no abiding impression on the mind.

'Once more—Poetry is superior to painting: for poetry is progressive, painting stationary, in its powers of description. Poetry elevates the soul through every rising gradation of thought and feeling, and produces its grandest effects at the last: painting begins precisely where poetry ends, with the climax of the subject, and lets down the mind from the catastrophe, through the details of the story, imperceptibly soothing it from sublime astonishment into tranquil approbation. Poetry tells its own story; painting usually requires an interpreter. Painting is limited to a moment of time, and an eye-glance of space; but it must be confessed that it can make that moment last for years, and render that eye-glance as illustrious as the sun. Poetry is restricted neither to time nor place; resembling the sun itself, it may shine in every quarter of the globe, and endure to the end of ages.

'Poetry has a fourth peculiarity, to which we have not yet alluded:—though the most beneficial to the world, it is the most unprofitable to its possessors of all the fine arts. There has scarcely been a period, or a country, in which a poet could live by his skill. It is allowed that great honors and emoluments have been bestowed on some of the tribe; but munificent patronage is yet rarer than transcendant talents:—at the court of Augustus there was only one Mecænas, but there were many poets. Now, in all ages and nations, musicians and painters of every description have been able to get bread by their labors, and in general they have been dignified and remunerated to the extent of their merits. It must be enough to make a poor poet burst with spleen to read the lives of eminent musicians and painters, and contrast them with those of his more illustrious brethren: while the former have been courted, enriched, and ennobled, by pontiffs and princes, the latter have languished in poverty, and died in despair. Will any man deny that the poems of Milton, as works of genius, are equal to the pictures of Rubens? Yet the painter's pencil supported him in princely magnificence; the poet's muse could not procure, what even his enemies would have furnished to him gratuitously in a dungeon—bread and water. Poets might be permitted to say, that painting and music may be appreciated in this world, and recompensed by the kings of it; but poetry cannot: its 'price is above rubies,' and its honors are those which kings cannot confer.'—Eclectic Review iii. 847.

Mr. Hazlitt, who yet can call poetry afterwards an 'imitation of nature,' has the following sprightly and correct passage on its general character:—'Poetry is the language of the imagination and the passions. It relates to whatever gives immediate pleasure or pain to the human mind. It comes home to the bosoms and businesses of men; for nothing but what so comes home to them in the most general and intelligible shape can be a subject for poetry. Poetry is the universal language which the heart holds with nature and itself. He who has a contempt for poetry cannot have much respect for himself, or for any thing else. It is not a mere frivolous accomplishment (as some persons have been led to imagine), the trifling amusement of a few idle readers or leisure hours—it has been the study and delight of mankind in all ages. Many people suppose that poetry is something to be found only in books, contained in lines of ten syllables, with like endings: but wherever there is a sense of beauty, or power, or harmony, as in the motion of a wave of the sea, in the growth of a flower that 'spreads its sweet leaves through the air, and dedicates its beauty to the sun,'—*there* is poetry in its birth. If history is a grave study, poetry may be said to be a graver: its materials lie deeper, and are spread wider. History treats, for the most part, of the cumbrous and unwieldy masses of things, the empty cases in which the affairs of the world are packed, under the heads of intrigue or war, in different states, and from century to century: but there is no thought or feeling that can have entered into the mind of man, which he would be eager to communicate to others, or which they would listen to with delight, that is not a fit subject for poetry. It is not a branch of authorship: it is 'the stuff of which our life is made.' The rest is 'mere oblivion,' a dead letter: for all that is worth remembering in life is the poetry of it. Fear is poetry, hope is poetry, love is poetry, hatred is poetry, contempt, jealousy, remorse, admiration, wonder, pity, despair, and madness, are all poetry. Poetry is that fine particle within us, that expands, rarefies, refines, raises our whole being: without it 'man's life is poor as beast's.' Man is a poetical animal: and those of us who do not study the principles of poetry act upon them all our lives, like Moliere's Bourgeois Gentilhomme, who had always spoken prose without knowing it. The child is a poet, in fact, when he first plays at hide-and-seek, or repeats the story of Jack the Giant-killer; the shepherd-boy is a poet when he first crowns his mistress with a garland of flowers; the countryman when he stops to look at the rainbow; the city apprentice when he gazes after the lord mayor's show; the miser when he hugs his gold; the courtier who builds his hopes upon a smile; the savage who paints his idol with blood; the slave who worships a tyrant, or the tyrant who fancies himself a god;—the vain, the ambitious, the proud, the choleric man, the hero and the coward, the beggar and the king, the rich and the poor, the young and the old, all live in a world of their own making; and the poet does no more than describe what all the others think and act. If his art is folly and madness, it is folly and madness at second hand. 'There is warrant for it.' Poets alone have not 'such seething brains, such shaping fantasies, that apprehend more than cooler reason' can.

'The lunatic, the lover, and the poet
Are of imagination all compact.
One sees more devils than vast hell can hold;
The madman. While the lover, all as frantic,
Sees Helen's beauty in a brow of Egypt.
The poet's eye, in a fine frenzy rolling,
Doth glance from heaven to earth, from earth to heaven;
And, as imagination bodies forth
The forms of things unknown, the poet's pen
Turns them to shape, and gives to airy nothing
A local habitation and a name.
Such tricks hath strong imagination.'

But we are most happy to be supported in our views of the high claims of this art by such a man as Dr. Channing of America. In his admirable Remarks on the Character and Writings of John Milton he says, 'Of all God's gifts of intellect, he [Milton] esteemed poetical genius the most transcendant. He esteemed it in himself as a kind of inspiration, and wrote his great works with something of the conscious dignity of a prophet. We agree with Milton in his estimate of poetry. It seems to us the divinest of all arts; for it is the breathing or expression of that principle or sentiment which is deepest and sublimest in human nature; we mean of that thirst or aspiration to which no mind is wholly a stranger, for something purer and lovelier, something more powerful, lofty, and thrilling, than ordinary and real life affords. No doctrine is more common among Christians than that of man's immortality; but it is not so generally understood, that the germs or principles of his whole future being are now wrapped up in his soul, as the rudiments of the future plant in the seed. As a necessary result of this constitution, the soul, possessed and moved by these mighty though infant energies, is perpetually stretching beyond what is present and visible, struggling against the bounds of its earthly prison-house, and seeking relief and joy in imaginings of unseen and ideal being. This view of our nature, which has never been fully developed, and which goes further towards explaining the contradictions of human life than all others, carries us to the very foundation and sources of poetry. He who cannot interpret by his own consciousness what we now have said, wants the true key to works of genius. He has not penetrated those sacred recesses of the soul, where poetry is born and nourished, and inhales immortal vigor, and wings herself for her heavenward flight. In an intellectual nature, framed for progress and for higher modes of being, there must be creative energies, powers of original and ever growing thought; and poetry is the form in which these energies are chiefly manifested. It is the glorious prerogative of this art that 'it makes all things new' for the gratification of a divine instinct. It indeed finds its elements in what it actually sees and experiences, in the worlds of matter and mind; but it combines and blends these into new forms and according to new affinities; breaks down, if we may so say, the distinctions and bounds of nature; imparts to material objects life, and sentiment, and emotion, and invests the mind with the powers and splendors of the outward creation; describes the surrounding universe in the colors which the passions throw over it, and depicts the mind in those modes of repose or agitation, of tenderness or sublime emotion, which manifest its thirst for a more powerful and joyful existence. To a man of a literal and prosaic character, the mind may seem lawless in these workings; but it observes higher laws than it transgresses, the laws of the immortal intellect; it is trying and developing its best faculties; and in the objects which it describes, or in the emotions which it awakens, anticipates those states of progressive power, splendor, beauty, and happiness, for which it was created.

'We accordingly believe that poetry, far from injuring society, is one of the great instruments of its refinement and exaltation. It lifts the mind above ordinary life, gives it a respite from depressing cares, and awakens the consciousness of its affinity with what is pure and noble. In its legitimate and highest efforts it has the same tendency and aim with Christianity; that is, to spiritualise our nature. True, poetry has been made the instrument of vice, the pander of bad passions; but, when genius thus stoops, it dims its fires, and parts with much of its power; and, even when poetry is enslaved to licentiousness or misanthropy, she cannot wholly forget her true vocation. Strains of pure feeling, touches of tenderness, images of innocent happiness, sympathies with suffering virtue, bursts of scorn or indignation at the hollowness of the world, passages true to our moral nature, often escape in an immoral work, and show us how hard it is for a gifted spirit to divorce itself wholly from what is good. Poetry has a natural alliance with our best affections. It delights in the beauty and sublimity of the outward creation and of the soul. It indeed portrays with terrible energy the excesses of the passions; but they are passions which show a mighty nature, which are full of power, which command awe, and excite a deep though shuddering sympathy. Its great tendency and purpose is, to carry the mind beyond and above the beaten, dusty, weary walks of ordinary life; to lift it into a purer element, and to breathe into it more profound and generous emotion. It reveals to us the loveliness of nature, brings back the freshness of youthful feeling, revives the relish of simple pleasures, keeps unquenched the enthusiasm which warmed the spring-time of our being, refines youthful love, strengthens our interest in human nature by vivid delineations of its tenderest and loftiest feelings, spreads our sympathies over all classes of society, knits us by new ties with universal being, and through the brightness of its prophetic visions helps faith to lay hold on the future life.

'We are aware that it is objected to poetry, that it gives wrong views and excites false expectations of life, peoples the mind with shadows and illusions, and builds up imagination on the ruins of wisdom. That there is a wisdom against which poetry wars, the wisdom of the senses, which makes physical comfort and gratification the supreme good, and wealth the chief interest of life, we do not deny; nor do we deem it the least service which poetry

renders to mankind, that it redeems them from the thraldom of this earthborn prudence. But, passing over this topic, we would observe that the complaint against poetry as abounding in illusion and deception is in the main groundless. In many poems there is more of truth than in many histories and philosophic theories. The fictions of genius are often the vehicles of the sublimest verities, and its flashes often open new regions of thought, and throw new light on the mysteries of our being. In poetry the letter is falsehood, but the spirit is often profoundest wisdom. And, if truth thus dwells in the boldest fictions of the poet, much more may it be expected in his delineations of life; for the present life, which is the first stage of the immortal mind, abounds in the materials of poetry, and it is the high office of the bard to detect this divine element among the grosser labors and pleasures of our earthly being. The present life is not wholly prosaic, precise, tame, and finite. To the gifted eye it abounds in the poetic. The affections, which spread beyond ourselves and stretch far into futurity; the workings of mighty passions, which seem to arm the soul with an almost superhuman energy; the innocent and irrepressible joy of infancy; the bloom, and buoyancy, and dazzling hopes of youth; the throbbings of the heart, when it first wakes to love, and dreams of a happiness too vast for earth; woman, with her beauty, and grace, and gentleness, and fulness of feeling, and depth of affection, and her blushes of purity, and the tones and looks which only a mother's heart can inspire;—these are all poetical. It is not true that the poet paints a life which does not exist. He only extracts and concentrates, as it were, life's ethereal essence, arrests and condenses its volatile fragrance, brings together its scattered beauties, and prolongs its more refined but evanescent joys; and in this he does well; for it is good to feel that life is not wholly usurped by cares for subsistence, and physical gratifications, but admits, in measures which may be indefinitely enlarged, sentiments and delights worthy of a higher being. This power of poetry to refine our views of life and happiness is more and more needed as society advances. It is needed to withstand the encroachments of heartless and artificial manners, which make civilisation so tame and uninteresting. It is needed to counteract the tendency of physical science, which being now sought, not as formerly for intellectual gratification, but for multiplying bodily comforts, requires a new development of imagination, taste, and poetry, to preserve men from sinking into an earthly, material, epicurean life.—Our remarks in vindication of poetry have extended beyond our original design. They have had a higher aim than to assert the dignity of Milton as a poet, and that is, to endear and recommend this divine art to all who reverence and would cultivate and refine their nature.'

Of the *oriental* poetry we can here only remark that, while gems of the brightest genius abound in it to luxuriance, in the poetry of ancient Greece and Rome alone do they appear set and polished to perfection. There was a flexibility in the language of the Greeks admirably adapted to give every fluctuation of thought and feeling its due expression, while the well ascertained and disciplined numbers of their syllables became real notes to this music of the soul.

Different names were given to these important combinations: the most useful were the spondee, composed of two long syllables; and the dactyl, of one long and two short syllables. These were solely employed in the construction of the hexameter verse, of which an imitation has been vainly attempted in English. Witness the last and not least attempt of our poets in this way, that of Mr. Southey in the Vision of Judgment: the movement of which has been well given in—

Jack ascended the hill, and Jill he ascended it also,
Down tumbled poor Jack, and Jill he came tumbling down after,
Jack fractured his crown, but of Jill nothing more is recorded.

The pronunciation of the Greek and Latin languages is, indeed, almost as totally lost to us as that of the Hebrew; but such is the exquisite mechanism of their metre that their verses cannot be read without producing a rich and melodious intonation.

It is somewhat uncertain what species of poetry was first cultivated in Greece. Fables, as among the oriental nations, were compositions of great antiquity; the ode formed a part of religious worship; the pastoral must have been introduced in an age sufficiently refined to relish simplicity. The immortal poems of Homer were composed at an early epoch of Grecian literature, and, as is well known, transmitted by oral tradition to a more polished age. Of this extraordinary man so much has been said that it would appear difficult to say any thing which should not now be trivial or impertinent. We may observe that it is pretended the Iliad and Odyssey were composed at different eras, by various authors; and that these desultory tales were at length collocated and edited by some ingenious critic, who might possibly have been distinguished by the appellation of Homer. The novelty and extravagance of this hypothesis have perhaps obtained for it partisans among those professed sceptics and segregatists who can perceive no difference between vulgar errors and popular opinions, and whose ambition it is to recede as far as possible from the convictions of other men. It is generally admitted that the excellence in which the supposed Homer stands unrivalled is the energy of his conceptions, which gives to his personages, his scenes, and his descriptions a kind of real existence. With such felicity are his characters cast that no reader of feeling can be at a loss to conceive how Achilles would look, or Nestor speak, or Ulysses act, on any occasion. Let any unprejudiced man decide whether such exquisite harmony of design could have been the result of chance, or of each book having its separate Homer?

The name of Pindar has descended to us with honor; for of *lyrical* compositions the most popular was the heroic ode: but the poems which inspired in his compatriots the most ex-

alted enthusiasm are but imperfectly understood, and are almost incapable of translation. The public recitation of the ode was accompanied both by music and dancing: a circumstance to which its structure was obviously adapted. The two first stanzas, called the strophe and the antistrophe, were of equal length. In the first part the performers approached the altars; in the latter, the dance being inverted, they measured back their steps to their former place, where, whilst they sung the epode, they stood still. It appears that this form was peculiar to the heroic ode. There were other lyrical compositions of a different cast. Sappho's poems inspire only tender impassioned sentiment; those of Anacreon, whether amatory or convivial, are equally remote from the sublimity of Pindar, and the melting softness of Sappho. The fervid imagination of Pindar is compared by Horace to the impetuosity of a mountain torrent:—

> Monte decurrens velut amnis, imbres
> Quem super notas aluere ripas,
> Fervet, immensusque ruit profundo
> Pindarus ore.

From the heroic ode the regular drama was derived. The invention of dialogue and action, as we have shown in the article already referred to, belongs to Æschylus; the original ode was preserved in the chorus, which constituted the popular part of the entertainment. Like the band of a modern orchestra, the chorus was composed of several persons who recited in a different manner from the other performers. We learn from Horace that their business was to deduce from the passing scene some lesson of morality, or to inculcate on the spectator some religious precept.

The rules of the ancient drama were suited to its institution. The unities of time and place were necessary in a performance to which the auxiliary resources of modern machinery were wanting, and from which all the illusions of the modern scene were precluded. The tragedies of Euripides and Sophocles were masterpieces in their kind, but would now probably be little relished even by scholars and scholastic enthusiasts.

Comedy, also, originally consisted of a chorus. The rudiments of the comic art may, perhaps, be detected in the satyrs, a sort of interlude first annexed to tragedies, in which the scene was rural, and the personages Satyrs, or sylvan deities. In the plays of Aristophanes living characters were introduced, and Socrates beheld himself ridiculed on the stage. This abuse a better taste corrected; and the comedies of Menander, or the new comedy (imitated by Terence), exhibited only interesting pictures of domestic life. The chorus at first appendant on comedy, was gradually changed into the prologue, a personage who carefully apprised the spectators of all they were to see.

Ennius, one of the elder Roman poets, first produced the satire, a species of miscellaneous poetry purely Roman, which was destined to receive perfection from Horace. With equal originality, Lucretius wrote his metaphysical poem, in which are developed the philosophical systems of his age; but it was not till the era of Augustus that the bards of Latium established any equality with those of Greece. It was then that Horace, not satisfied with having transplanted all the Greek lyric beauties in his odes, opened a rich vein of satiric poetry; and Virgil, having equalled Theocritus, aspired to emulate Homer. In the Æneid it may be acknowledged that he sometimes fell short of his master. His characters possess not the same features, durability, and grandeur: nor are his scenes equally animated and dramatic. To atone for these defects, he unites every charm that gives interest to narrative or enchantment to description; occasionally he rises to the sublime, but the beautiful is his natural element; he can excite terror, but he is more prone to inspire tenderness and pity. In the delicate touches of nature and pathos, he seems to have grown enamoured of his subject, and to have lingered affectionately on the endearing scenes and charities of domestic life. In the Georgics, Virgil has left a model of didactic composition, ennobled by a strain of pure philosophical sentiment. Ovid, whose talents were not less versatile than those of his contemporaries, adorned the fables of mythology with description, and illustrated in his epistles almost every romantic story of antiquity. The style of his elegies is not unlike that of his epistles: he paints to the eye, but he has often too much wit and fancy to touch the heart. Tibullus has, perhaps, exceeded every other elegiac writer in simplicity and tenderness. Lucan and Statius were also epic poets, but they are seldom quoted, and not often read. Lucan possessed a genius of an exalted order; but his subject was peculiarly unfortunate, and his beauties are now neglected because they are found in scenes repulsive to the imagination, and uncongenial with the feelings. Among the last of the Roman poets appeared Juvenal and Persius, of whom the former was one of the most original writers she had produced. He professes to exhibit a picture of his times; and there is in his manner an undissembled fervor that well atones for his occasional ruggedness.

We have only room to glance at the *origin of modern poetry*. The barbarous nations who subdued Rome, though ignorant of the polite arts, were not insensible to the charms of poetry. Their bards were no less venerated than their priests; and whatever instruction they received, whatever knowledge they possessed, was communicated in metre. In the age of Charlemagne the minstrels of Provence, or, as they were called, the troubadours, introduced the metrical tales or ballads, which, from the dialect in which they were written, acquired the name of romances. Their poems were all composed in rhyme; but whether this practice was borrowed from the Arabs or the Goths is uncertain. The Italian language, which of all the corrupt dialects introduced by the barbarians assimilated most with the Roman, soon acquired a tincture of elegance. In the middle ages Dante wrote; Ariosto followed; and Petrarch, the enthusiastical votary of classical genius, appeared among the first founders of modern literature. The passion for allegory, so long the characteristic of the Italian

school, was by Chaucer rendered as prevalent in England as it had previously been on the continent. During several ages, Italy continued to be the Poets' Land of Europe; and in that interval was produced the Jerusalem Delivered, a poem not unworthy of a Roman bard, or an Augustan age.

We may here remark that we owe to the Italian Masque the Comus of Milton; which however, as has been well observed, 'is as far superior to the Faithful Shepherdess, as the Faithful Shepherdess is to the Aminta, or the Aminta to the Pastor Fido. It was well for Milton that he had here no Euripides to mislead him. He understood and loved the literature of modern Italy. But he did not feel for it the same veneration which he entertained for the remains of Athenian and Roman poetry, consecrated by so many lofty and endearing recollections. The faults, moreover, of his Italian predecessors, were of a kind to which his mind had a deadly antipathy. He could stoop to a plain style, sometimes even to a bald style; but false brilliancy was his utter aversion.' The above writer (Edinburgh Review, August 1825) has run a parallel between Dante in the Divine Comedy and Milton's Paradise Lost, which we are sure our readers will thank us for transcribing here.

'The poetry of Milton differs from that of Dante as the hieroglyphics of Egypt differed from the picture-writing of Mexico. The images which Dante employs speak for themselves:—they stand simply for what they are. Those of Milton have a signification which is often discernible only to the initiated. Their value depends less on what they directly represent, than on what they remotely suggest. However strange, however grotesque, may be the appearance which Dante undertakes to describe, he never shrinks from describing it. He gives us the shape, the color, the sound, the smell, the taste; he counts the numbers; he measures the size. His similes are the illustrations of a traveller. Unlike those of other poets, and especially of Milton, they are introduced in a plain business-like manner, not for the sake of any beauty in the objects from which they are drawn, not for the sake of any ornament which they may impart to the poem, but simply in order to make the meaning of the writer as clear to the reader as it is to himself. The ruins of the precipice which led from the sixth to the seventh circle of hell were like those of the rock which fell into the Adige on the south of Trent. The cataract of Phlegethon was like that of Aqua Cheta at the monastery of St. Benedict. The place where the heretics were confined in burning tombs resembled the vast cemetery of Arles! Now, let us compare with the exact details of Dante the dim intimations of Milton. We will cite a few examples. The English poet has never thought of taking the measure of Satan. He gives us merely a vague idea of vast bulk. In one passage the fiend lies stretched out huge in length, floating many a rood, equal in size to the earth-born enemies of Jove, or to the sea-monster which the mariner mistakes for an island. When he addresses himself to battle against the guardian angels, he stands like Teneriffe or Atlas; his stature reaches the sky. Contrast with these descriptions the lines in which Dante has described the gigantic spectre of Nimrod. 'His face seemed to me as long and as broad as the ball of St. Peter's at Rome; and his other limbs were in proportion; so that the bank, which concealed him from the waist downwards, nevertheless showed so much of him, that three tall Germans would in vain have attempted to reach to his hair.' We are sensible that we do no justice to the admirable style of the Florentine poet. But Mr. Cary's translation is not at hand; and our version, however rude, is sufficient to illustrate our meaning.

'Once more, compare the lazar-house in the eleventh book of the Paradise Lost with the last ward of Malebolge in Dante. Milton avoids the loathsome details, and takes refuge in indistinct but solemn and tremendous imagery,—despair hurrying from couch to couch to mock the wretches with his attendance, death shaking his dart over them, but, in spite of supplications, delaying to strike. What says Dante? 'There was such a moan there, as there would be if all the sick who, between July and September, are in the hospitals of Valdichiana, and of the Tuscan swamps, and of Sardinia, were in one pit together; and such a stench was issuing forth as is wont to issue from decayed limbs.'

'We will not take upon ourselves the invidious office of settling precedency between two such writers. Each in his own department is incomparable; and each, we may remark, has, wisely or fortunately, taken a subject adapted to exhibit his peculiar talent to the greatest advantage. The Divine Comedy is a personal narrative. Dante is the eye-witness and ear-witness of that which he relates. He is the very man who has heard the tormented spirits crying out for the second death, who has read the dusky characters on the portal within which there is no hope, who has hidden his face from the terrors of the Gorgon, who has fled from the hooks and the seething pitch of Barbariccia and Diaghignazzo. His own hands have grasped the shaggy sides of Lucifer. His own feet have climbed the mountain of expiation. His own brow has been marked by the purifying angel. The reader would throw aside such a tale in incredulous disgust, unless it were told with the strongest air of veracity, with a sobriety even in its horrors, with the greatest precision and multiplicy in its details. The narrative of Milton in this respect differs from that of Dante, as the adventures of Amadis differ from those of Gulliver. The author of Amadis would have made his book ridiculous if he had introduced those minute particulars which give such a charm to the work of Swift, the nautical observations, the affected delicacy about names, the official documents transcribed at full length, and all the unmeaning gossip and scandal of the court, springing out of nothing, and tending to nothing. We are not shocked at being told that a man who lived, nobody knows when, saw many very strange sights, and we can easily abandon ourselves to the illusion of the romance. But when Lemuel Gulliver, surgeon, now actually resident at Rotherhithe, tells us of pygmies and giants, flying

islands and philosophising horses, nothing but such circumstantial touches could produce for a single moment a deception on the imagination. Of all the poets who have introduced into their works the agency of supernatural beings, Milton has succeeded best. Here Dante decidedly yields to him: and, as this is a point on which many rash and ill-considered judgments have been pronounced, we feel inclined to dwell on it a little longer. The most fatal error which a poet can possibly commit, in the management of his machinery, is that of attempting to philosophise too much. Milton has been often censured for ascribing to spirits many functions of which spirits must be incapable. But these objections, though sanctioned by eminent names, originate, we venture to say, in profound ignorance of the art of poetry.'

In Spain, though poetry was early cultivated, it was but with little attention to classical taste. In France it did not emerge from barbarism till the reign of Francis I., and arrived perhaps at its ultimate point of perfection in the era of Louis XIV. La Fontaine and Boileau, Corneille and Racine, had then lived, and produced works destined to immortalise their names. Unfortunately for French poets, criticism was then almost coeval with poetry; and a pedantic attention to rules was permitted to repress the native energies of genius. We have traced in our article DRAMA the origin of the modern drama, in the mysteries; a sort of religious farce, imported from the east. To the mysteries succeeded allegorical plays, called moralities: these produced the mask, which became the favourite amusement of the court in the time of Charles I., and is only redeemed from opprobium and oblivion by Milton's Comus. Gondibert, written by lord Sackville, was the first tragedy represented on an English stage.

Till the commencement of the eighteenth century, the German language was almost a stranger to poetry. Klopstock introduced into it hexameter verse, in which the mechanism of classical numbers is rather perceived than felt. From that era, Germany has been more productive of books than all the rest of Europe; and, during this period, many writers have arisen of real and original genius: but the literary commerce of the country is chiefly supported by translation.

With regard to the *art of poetry*, as it has been taught by rules, we are of opinion with Sir William Temple, 'The utmost that can be achieved, or I think pretended, by any rules in the art of poetry is but to hinder some men from being very bad poets; but not to make any man a very good one.' See, however, our article VERSIFICATION for something on this head.

The public taste of this country has, upon the whole, within the last half century, been simplified, purified, and invigorated. Men have begun to be weaned from the perusasion that poetry is something necessarily striking and dazzling, and epigrammatic, and antithetical: squared and balanced by rule and measure; and made up of established periphrases, conventional phrases, and traditional metaphors; forming altogether a sort of poetic cypher; a symbolical diction as unlike as possible to the language immemorially spoken by men and women and children. They have begun to give up the expectation that every word and line in poetry must be essentially different from prose; to perceive that to call a line flat or lagging is sometimes the dictate of an inflexible and prejudiced ear, not knowing or not considering that poetry has its reliefs as well as painting. They have begun to admit that poetry, like prose, must have her moods of relation; her easy moments; her bye-passages and resting-places: to discover, in short, that poetry is not a being of mere artifice, moving in buckram and sparkling with embroidery; but that, like the mountain shepherdess, she searches the woods and the meadows for her fairest and freshest ornaments, assumes all the changing colors, and follows all the vagrant varieties of primitive nature: 'Mille habet ornatus; mille decenter habet.'

We conclude with a passage which ably groupes the characters of our chief modern poets.

'Waller is the first writer who made prose sound agreeably in rhyme. He was in truth an indifferent poet, possessing little genius as an author, or principle as a man, and obtained a name chiefly by reducing verse to 'the level of the meanest capacity.' But, in fact, the first name of that period which is really great is that of Dryden. Dryden was at the head of his line. As a bitter, biting satirist, as a writer of sensible, masculine, sounding verse, there is no one who goes beyond him. But as a poet he was of a different order from those who illuminated the reigns of Elizabeth and James; and he occupied, in our opinions, a decidedly lower step. He was a writer of shrewd sarcasm and of excellent good sense, but he was deficient in imagination, in pathos, and in nature. He was more artificial, generally speaking, than his predecessors; and he ought to have been more natural, for he resorted far more to common phraseology and existing people. Nevertheless, it is not too much to say that he failed signally in tragedy, and that he did not excel in narrative or in tender serious poetry many of inferior reputation who have preceded and followed him. But in the war of verse he was in his element. He fought well and effectually; he gave blow back for blow, and knew the weak side of his foes, and launched his sounding anathemas against their characters and persons. His 'Absalom and Achitophel,' and 'Mac-Flecnoe' are each capital, are each excellent satires, though the palm must assuredly be awarded to the former poem. 'The Hind and the Panther' also is a fine thing in its way; but it differs little in point of style from such of his productions as were merely satirical.

'Contemporary with Dryden was Lee, a powerful irregular writer, whose stormy verses shook the stage from its propriety, and Shadwell, the 'Young Ascanius' of Mac-Flecnoe, who swore

That he to death true Dullness would maintain;
And in his father's right and realm's defence,
Ne'er to have peace with wit, nor truce with sense.

Then came Sedley and Dorset, and John Phillips (the author of the Splendid Shilling), and Rowe, and Parnell (who wrote the Hermit),

and witty Dr. Garth and Addison, so great in prose and so little in poetry; and lively laughing Mat. Prior, to whom the world was a joke; then followed Vanbrugh and Congreve, the brilliant twins of Comedy, and Gay (who reduced folly to a fable, and wrote Black-eyed Susan, and the Beggar's Opera), and lastly, the better known and more justly celebrated Alexander Pope.

'Pope was a fit successor for the chair of Dryden. He had the same good sense, the same stinging sarcasm; the same hatred of what is base or mean, with something more of refinement, and a clearer moral view than can perhaps be ascribed to his predecessor. Each, however, belonged to his age, and illustrated it finely. Dryden would have been out of place at the court of queen Anne, and Pope could not easily have reconciled himself to the coarse gallants and lascivious wits of the Restoration. The one had a strong arm and a fearless spirit, and struck down whole squadrons of rogues and politicians, with all the indignation of a moralist, and the rancour of a partisan. The other shot his sharp arrows at the heart of the proud man and the knave, the time-server, and the hypocrite (whether hidden in an alias or covered with lawn); he spared neither rank, nor sex, nor age, so it were impudent and profligate; but wisely thought that, if a reformation in morals was to be effected, it must be effected by example; not of the poor, but of the high-born and opulent. This led him amongst the aristocracy of his time; and he whipped the gilded follies and humble sins of the wealthy, with as much good will and more honesty than the magistrates of our time exercise their summary justice upon the petty offenders who sell cabbages and beef upon the Sabbath. Pope, in a word, was a first-rate writer of the same genius as Dryden, and upon the whole his equal. His poems contain passages of great pathos, of piercing satire, and of admirably turned compliment; and his Rape of the Lock has never yet been equalled. Next to Pope we may record Swift, a stern, shrewd, sarcastic writer of verse, and a 'fellow of infinite humor.' There were two sides, however, to the dean's character, one of which we do not desire at present to contemplate: but the other was rich and bright as the genius of wit could make it. After him we find the name of Thomson, who looked on Nature with an observant but easy eye, and transcribed her varying wonders to man. His Seasons contain finer or at least more popular things than any of his other poems (although he but too frequently amplifies a simple fact, till you scarcely know what he is about); but there is a much more equal power, and far more pure poetry in his delightful Castle of Indolence. It was here that he built up those shadowy battlements, and planted those 'sleep-soothing' groves, under which lay

> 'Idlesse, in her dreaming mood.'

It was here that he wove in his poetic loom those pictures of pastoral quiet—of flowery lawns and glittering streams—of flocks and tranquil skies, and verdant plains,

> 'And vacant shepherds piping in the dale'—

the stock-dove, and the nightingale, and the rest of that tuneful quire which lull our minds into forgetfulness, and sing to us on summer mornings and winter nights, in town and in country equally well, until we forget the prose of human life in its romance, and bathe our fevered senses in the fresh flowers of poetry which the bounty of Thomson has bequeathed to us! There is nothing in the history of verse, from the restoration of Charles II. to the present time (not even in Collins, we think, and certainly not in Gray), which can compete with the first part of the Castle of Indolence. His account of 'Drowsy Head,' and

> 'Of dreams that wave before the half-shut eye,'

of the disappearance of the sons of Indolence, with the exquisite simile with which it closes—the huge covered tables, all odorous with spice and wine—the tapestried halls and their Italian pictures—the melancholy music—and, altogether, the golden magnificence and oriental luxuries of the place, aud the ministering of the spirits who

> 'Poured all the Arabian heaven upon our nights,'

(an exquisite line)—may stand in comparison with almost any thing in the circle of poetry.

'We must not forget, in our list, Dr. Young, whose Night Thoughts have acquired at least as much reputation as they deserve—nor the unfortunate, and not very deserving Richard Savage—nor Cibber, the prince of coxcombs—nor Churchill, a coarse and immoral satirist—nor Shenstone, fine and finical, though with touches of tenderness and beauty—especially in his sweet Spenserian stanzas of The Schoolmistress. After him came Mark Akenside—Armstrong—excellent Goldsmith—and Gray—and his satellite Mason. Of these, and indeed of most of the other modern writers of verse, so much has been said in various places (in fact, we ourselves have had occasion frequently to glance at them), that we shall not now trouble the reader with any further discussion on the subject. In the same manner also must we now pass over the few remaining names on the poetic roll, with the exception of Warton, Cowper, and Burns; in truth, there are no other which can claim our particular attention. The two latter are great names; and we think deserving of all the fame they inherit. The effect of Cowper's writings is even now observable in our poetry; and Burns is, beyond all doubt, the greatest untaught poet since the time of Shakspeare.'—*Edin. Review*, *Aug.* 1825.

POGGIO BRACCIOLINI, or POGGIUS BRACCIOLINUS, a man of great talents and learning, who contributed much to the revival of knowledge in Europe, was born at Terra Nuova, in Florence, in 1380. He studied Latin and Greek under John of Ravenna, and Emanuel Chrysoloras. He was first writer of the apostolic letters, an office which he held ten years, and was then made apostolic secretary, which he held forty years under seven popes. In 1453,

when he was seventy-two years of age, he accepted the employment of secretary to the republic of Florence, to which place he removed, and died in 1459, aged seventy-nine. He visited several countries, and searched many monasteries, to recover ancient authors, numbers of which he brought to light. He sold a MS. copy of Livy, written with his own hand, for so large a sum that he purchased an estate with it near Florence. His own works consist of moral pieces, orations, letters, and a History of Florence from 1350 to 1455, which is his chief work. His life was disgracefully licentious.

POGO is a name by which the inhabitants of the Philippine Islands distinguish their quail, which, though smaller than ours, is in every other respect very like it. See PERDIX.

POICTIERS. See POITIERS.

POI'GNANT, *adj.* } Fr. *poignant.* Sharp;
POI'GNANTLY, *adv.* } stimulating the palate; piercing: hence painful; the adverb corresponding.

No *poignant* sauce she knew, nor costly treat,
Her hunger gave a relish to her meat. *Dryden.*

The studious man whose will was never determined to *poignant* sauces and delicious wine, is, by hunger and thirst, determined to eating and drinking. *Locke.*

Full three long hours his tender body did sustain
Most exquisite and *poignant* pain.
Norris's Miscellanies.

If God makes use of some *poignant* disease to let out the poisonous vapour, is not the mercy greater than the severity of the cure? *South's Sermons.*

I sat quietly down at my morsel, adding only a principle of hatred to all succeeding measures by way of sauce; and one point of conduct in the dutchess's life added much *poignancy* to it. *Swift.*

As almost every character which has excited either attention or pity has owed part of its success to merit, and part to a happy concurrence of circumstances in its favour: had Cæsar or Cromwell exchanged countries, the one might have been a sergeant and the other an exciseman. So it is with wit, which generally succeeds more from being happily addressed, than from its native *poignancy*.
Goldsmith.

POINCIANA, Barbadoes flower-fence, or false ebony, a genus of the monogynia order, and decandria class of plants, natural order thirty-third, lomentaceæ: CAL. pentaphyllous; petals five, the uppermost larger than the rest; the stamina long, and all fertile; the seed vessel a legumen. There is only one species, viz.—

P. pulcherrima, a native of both Indies. It rises with a straight stalk ten or twelve feet high, which is covered with a gray bark, and is sometimes as thick as the small of a man's leg, dividing into several spreading branches at the top, which are armed at each joint with two short, crooked, strong spines, and garnished with decompound winged leaves, each leaf consisting of six or eight pairs of simple winged leaves. They are of a light green color, and when bruised emit a strong odor. The branches are terminated by loose spikes of flowers, sometimes formed like a pyramid, at others disposed more in the form of an umbel. The foot-stalk of each flower is nearly three inches long; the flower is composed of five petals, which are roundish at the top, but are contracted to narrow tails at the base. They spread open, and are beautifully variegated with a deep red or orange color, yellow, and some spots of green; and emit a very agreeable odor. After the flower is past, the germen becomes a broad flat pod three inches long, divided into three or four cells by transverse partitions, each including one flattish irregular seed. The plant is propagated by seeds; but, being tender, is to be constantly kept in the bark stove. It is very impatient of moisture in winter; and, if the least damp seizes its top, it either kills the plant or destroys its head. With proper management it will grow taller here than in the places where it is native; but its stems will not be thicker than a man's finger. In Barbadoes it is planted in hedges to divide the lands, whence it has the name of flower-fence. In the West Indies its leaves are made use of as a purge instead of senna; and in Jamaica it is called sena.

To POIND, in Scots law, to seize and sell a debtor's goods to pay his creditors.

POINSINET (Henry), A. A., a French dramatic writer, born at Fontainbleau in 1735, whose operas, being accompanied with excellent music, were very successful. He went in 1760 to Italy and Spain, but was drowned in the Guadalquiver.

POINT, *n. s.*, *v. a.* & *v. n.*
POINT'ED, *adj.*
POINT'EDLY, *adv.*
POINT'EDNESS, *n. s.*
POINT'EL, *n. s.*
POINT'ER,
POINT'ING-STOCK,
POINT'LESS, *adj.*
Fr. *pointe;* Wel. *pwynt;* Ital. *punto;* Span. *punta;* Port. *punta;* Belg. *punt;* Lat. *punctura.* A sharp or acuminated end; hence an indivisible portion of space or time; exact place; critical moment; thing or part of space at which any thing is aimed; act of aiming or striking; headland; promontory; degree; state; note in writing or in music; tune; spot; mark of a degree on the horizon or mariners' compass; instance; single position or assertion; single part of a whole or of a complicated question: to point is to sharpen; direct toward a point; show: as a verb neuter, note with the finger; bring to or force upon notice, taking *at* and *to*; to distinguish words or sentences by points; show distinctly: pointed, pointedly, and pointedness, follow the senses of the noun substantive, point: pointel is something placed on a point: pointer, a particular kind of dog that points out game: pointing-stock, a butt, or object of ridicule: pointless, blunt; obtuse; without object or meaning: pointblank, directly: point de vise, exact or exactly in the point of view; a Gallicism.

Esau said, Behold I am at the *point* to die; and what profit shall this birthright do to me?
Genesis xxv. 32.

From the great sea, you shall *point* out for you mount Hor. *Numbers* xxxiv. 7.

The company did not meddle at all with the state *point*, as to the oaths; but kept themselves entirely to the church *point* of her independency, as to her purely spiritual authority, from the state. *Lesley.*

The highest *point* outward things can bring unto is the contentment of the mind, with which no estate is miserable. *Sidney.*

The fifth had charge sick persons to attend,
And comfort those in *point* of death which lay.
Spenser. Faerie Queene.

The thorny *point*
Of bare distress hath ta'en from me the shew
Of smooth fidelity. *Shakspeare. As You Like It.*

If your son have not the day,
For a silken *point* I'll give my barony.
Shakspeare.

I am resolved on two *points*;
That if one break the other will hold;
Or if both break, your gaskins fall. *Id.*

How oft, when men are at the *point* of death,
Have they been merry! which their keepers call
A lightning before death. *Id.*

Carve out dials *point* by *point*,
Thereby to see the minutes how they run. *Id.*

A figure like your father,
Armed at all *points* exactly cap-a-pe,
Appears before them. *Id. Hamlet.*

What a *point* your falcon made,
And what a pitch she flew above the rest.
Shakspeare.

I'll hear him his confessions justify,
And *point* by *point* the treasons of his master
He shall again relate. *Id. Henry VIII.*

You, my lord archbishop,
Whose white investments figure innocence,
Wherefore do you so ill translate yourself
Into the harsh and boist'rous tongue of war?
Turning your tongue divine
To a loud trumpet, and a *point* of war.
Shakspeare.

This boy will carry a letter twenty mile, as easy as a cannon will shoot *pointblank* twelve score. *Id.*

Every thing about you should demonstrate a careless desolation; but you are rather *point de vise* in your accoutrements, as loving yourself, than the lover of another. *Id.*

Alas! to make me
A fixed figure, for the hand of scorn
To *point* his slow unmeaning finger at. *Id.*

I, his forlorn dutchess,
Was made a wonder and a *pointingstock*
To every idle rascal follower. *Id. Henry VI.*

There arose strong winds from the south, with a *point* east, which carried us up.
Bacon's New Atlantis.

A seaman, coming before the judges of the admiralty for admittance into an office of a ship, was by one of the judges much slighted; the judge telling him, that he believed he could not say the *points* of his compass. *Bacon.*

A war upon the Turks is more worthy than upon any other Gentiles, in *point* of religion and in *point* of honour. *Id.*

The other level *pointblank* at the inventing of causes and axioms. *Id.*

Men's behaviour should be like their apparel, not too straight or *point de vise*, but free for exercise. *Id.*

The princes of Germany had but a dull fear of the greatness of Spain; now that fear is sharpened and *pointed*, by the Spaniards late enterprizes upon the Palatinate. *Id.*

Then neither from eternity before,
Nor from the time when time's first *point* begun,
Made he all souls. *Davies.*

Who setteth out prepared
At all *points* like a prince, attended with a guard.
Drayton.

The vicious language is vast and gaping, swelling, and irregular; when it contends to be high, full of rock, mountain, and *pointedness*. *Ben Jonson.*

The sun stands not still in one *point* of heaven but walks his daily round; that all the inferior world may share of his influences, both in heat and light.
Bp. Hall.

God hath chalked out his ways in the ten words of his royal law; the sinner turns his back upon every one of them, and walks *pointblank* opposite. *Id.*

Another vows the same;
A third t' a *point* more near the matter draws.
Daniel.

We doubt not but such as are not much conversant with the variety of authors, may have some leading helps to their studies of *points* of precedence, by this slight designation. *Selden.*

If you tempt her, the wind of fortune
May come about, and take another *point*,
And blast your glories. *Denham.*

King James was wont to say that the duke of Buckingham had given him a groom of his bedchamber, who could not truss his *points*. *Clarendon.*

That bright beam whose *point* now raised,
Bore him slope downward. *Milton.*

Shalt thou dispute
With God the *points* of liberty, who made
Thee what thou art? *Id. Paradise Lost.*

Vapours fired shew the mariner
From what *point* of his compass to beware
Impetuous winds. *Id.*

Mount Hermon, yonder sea, each place behold
As I *point*. *Milton.*

Unless it be the cannon ball,
That shot i' th' air *pointblank* upright,
Was born to that prodigious height,
That learned philosophers maintain
It ne'er came back. *Hudibras.*

East and West are but respective and mutable *points*, according unto different longitudes or distant parts of habitation. *Browne.*

You gain your *point*, if your industrious art
Can make unusual words easy. *Roscommon.*

With the history of Moses, no book in the world in *point* of antiquity can contend. *Tillotson.*

Estius declares that, although all the schoolmen were for l^tria to be given to the cross, yet that it is *pointblank* against the definition of the council of Nice. *Stillingfleet.*

A pyramid reversed may stand for a while upon its *point*, if balanced by admirable skill. *Temple.*

Democritus, spent with age, and just at the *point* of death, called for loaves of new bread, and, with the steam under his nose, prolonged his life till a feast ; past *Id.*

His majesty should make a peace, or turn the war directly upon such *points*, as may engage the nation in the support of it. *Id.*

Doubts if he wielded not a wooden spear
Without a *point*; he looked, the *point* was there.
Dryden.

He takes Lucan, who crowded sentences together, and was too full of *points*. *Id.*

At certain periods stars resume their place,
From the same *point* of heaven their course advance.
Id.

He had a moment's right in *point* of time;
Had I seen first, then his had been the crime. *Id.*

He, warned in dreams, his murder did foretel,
From *point* to *point*, as after it befel. *Id.*

Part new grind the blunted ax, and *point* the dart.
Id.

Who fortune's fault upon the poor can throw,
Point at the tattered coat and ragged shoe. *Id.*

A *pointed* flinty rock, all bare and black,
Grew gibbous from behind. *Id.*

The copiousness of his wit was such that he often writ too *pointedly* for his subject. *Id.*

Like Horace, you only expose the follies of men; and in this excel him, that you add *pointedness* of thought. *Id.*

Lay that *pointless* clergy-weapon by,
And to the laws, your sword of justice, fly. *Id.*

There is no creature so contemptible, but, by resolution, may gain his *point*. *L'Estrange.*

The faculties that were given us for the glory of our Master are turned *pointblank* against the intention of them. *Id.*

We sometimes speak of space, or do suppose a *point* in it at such a distance from any part of the universe. *Locke.*

Men would often see, what a small pittance of reason is mixed with those huffing opinions they are swelled with, with which they are so armed at all *points*, and with which they so confidently lay about them. *Id.*

It will become us, as rational creatures, to follow the direction of nature, where it seems to *point* us out the way. *Id.*

Sometimes we use one finger only, as in *pointing at* any thing. *Ray on the Creation.*

Is not the elder
By nature *pointed* out for preference? *Rowe.*

I don't see why Virgil has given the epithet of Alta to Prochita, which is much lower than Ischia, and all the *points* of land that lie within its neighbourhood. *Addison.*

In a commonwealth, the wealth of the county is so distributed, that most of the community are at their ease, though few are placed in extraordinary *points* of splendour. *Id.*

The two pinnæ stand upon either side, like the wings in the petasus of a Mercury, but rise much higher, and are more *pointed*. *Id. on Italy.*

I shall do justice to those who have distinguished themselves in learning, and *point* out their beauties. *Addison.*

Rouse up, for shame! our brothers of Pharsalia
Point at their wounds, and cry aloud to battle. *Id.*

On one small *point* of land,
Weary'd, uncertain, and amazed, we stand. *Prior.*

The subtle dog scow'rs with sagacious nose,
Now the warm scent assures the covey near,
He treads with caution, and he *points* with fear. *Gay.*

The well-taught *pointer* leads the way,
The scent grows warm; he stops, he springs his prey. *Id.*

They follow nature in their desires, carrying them no farther than she directs, and leaving off at the *point* at which excess would grow troublesome. *Atterbury.*

Stanislaus endeavours to establish the duodecuple proportion, by comparing scripture together with Josephus: but they will hardly prove his *point*. *Arbuthnot on Coins.*

These poises or *pointels* are, for the most part, little balls, set at the top of a slender stalk, which they can move every way at pleasure. *Derham.*

Times corrupt, and nature ill inclined,
Produced the *point* that left a sting behind. *Pope.*

Commas and *points* they place exactly right,
And 'twere a sin to rob them of their mite. *Id.*

Some on *pointed* wood
Transfixed the fragments, some prepared the food. *Id.*

Who now reads Cowley? if he pleases, yet
His moral pleases, not his *pointed* wit. *Id.*

I have extracted out of that pamphlet a few of those notorious falsehoods in *point* of fact and reasoning. *Swift.*

There is no *point* wherein I have so much laboured as that of improving and polishing all parts of conversation between persons of quality. *Id.*

To *point* at what time the balance of power was most equally held between their lords and common, in Rome would perhaps admit a controversy. *Id*

The poet intended to set the character of Arete in a fair *point* of light. *Broome.*

Fond the Jews are of their method of *pointing*. *Forbes.*

Tell him what are the wheels, springs, *pointer*, hammer, and bell, whereby a clock gives notice of the time. *Watts.*

The gloss produceth instances that are neither pertinent, nor prove the *point*. *Baker on Learning.*

The *point* of honour has been deemed of use;
To teach good manners, and to curb abuse. *Cowper.*

Shows with a *pointing* finger, but no noise,
A pale procession of past sinful joys,
All witnesses of blessings foully scorned,
And life abused, and not to be suborned. *Id.*

A book concerning the habitudes of animals, by Mr. Bindley, was lately advertised: I have not yet seen it. The subject is curious, but difficult: it requires long and patient attention to come to any certain conclusion respecting the manners and perhaps the nascent morals of animals; for a well-trained *pointer*, and other domesticated and well-educated animals, seem to have a knowledge of what may be called their duty to their master. *Bp. Watson.*

POINT, in astronomy, a term applied to certain places marked in the heavens, and distinguished by proper epithets, thus:—1. *Cardinal points* are four grand points or divisions of the horizon, viz. the east, west, north, and south. 2. *Equinoctial points*, the points wherein the equator and ecliptic intersect; particularly that whence the sun ascends towards the north pole, is called the vernal point; and that by which he descends to the south pole, the autumnal point. 3. *Solstitial points*, the points of the ecliptic, where the sun's ascent above the equator, and descent below it, terminate. The former is called particularly the estival or summer point; the latter the brumal or winter point. 4. *Vertical points*, the zenith and nadir: the points wherein the orbits of the planets cut the plane of the ecliptic are called the nodes. See ASTRONOMY.

POINT, in geography, is used for a cape or headland jutting out into the sea; thus seamen say, two points of land are in one another, when they are so in a right line against each other as that the innermost is hindered from being seen by the outermost.

POINT, in geometry, according to the celebrated definition of Euclid, is that which has neither parts nor magnitude. See GEOMETRY.

POINT, in grammar, is a character used to mark the divisions of discourse. See COLON, COMMA, &c. A point proper is a full stop or period. See PUNCTUATION.

POINT, in music, a mark or note anciently used to distinguish the tones or sounds: hence we still call it simple counter-point, when a note of the lower part answers exactly to that of an upper; and figurative counter-point, when any note is syncopated, and one of the parts makes several notes or inflexions of the voice, while the other holds on one. See MUSIC. In an-

cient music there are six species of points; viz. point of perfection; point of imperfection; point of augmentation; point of division, of translation, and alteration. 1. The point of perfection belongs to the ternary division. 2. The point of imperfection, placed on the left of the longa, diminishes its value. 3. The point of augmentation belongs to the binary division. 4. The point of division is placed before the semibreve, followed by a breve in perfect time; it takes the value of one minim away from the breve, and makes it worth two instead of three semibreves. 5. If a semibreve between two points be followed by two or more breves, in imperfect time, the second point transfers its signification to the last of these breves, and renders it perfect and equal to three minims; it is the point of translation. 6. A point between two semibreves, themselves placed between two breves or squares, in perfect time, takes away one minim from each of these breves, so that each breve is equal but to two semibreves in lieu of three; this is the point of alteration.

Point, in perspective, is used for various poles or places, with regard to the perspective plane. See Perspective.

Point, in several arts, an iron or steel instrument. Engravers, etchers, cutters in wood, &c., use points to trace their designs on the copper, wood, stone, &c. See Engraving, &c.

Point, in the manufactories, is a term once used for all kinds of laces wrought with the needle; such as the point de Venice, point de France, point de Genoa, &c., which are distinguished by the particular economy and arrangement of their points. Point is sometimes used for lace woven with bobbins; as English point, point de Malines, point d'Havre, &c.

Points, in electricity, are those acute terminations of bodies which facilitate the passage of the electrical fluid from or to such bodies. See Electricity, Index.

Points, in heraldry, are the several different parts of an escutcheon, denoting the local position of any figure. See Heraldry.

Points, in philology, or the Hebrew Vowel Points, are characters which have been employed in the Hebrew language in the lieu of vowels to express the vowel sounds. See Masora. The controversy whether the Hebrews originally used any vowels, or whether the points, which are now called by that name, were substituted instead of them; or, if they were, whether they be as old as Moses, or were invented by Ezra, or by the Masorites, has exercised the wits of the most learned critics of the three last centuries, says a late able writer, and is still undetermined. The Jews maintain that these vowel points were delivered to Moses along with the tables of the law; and consequently hold them as sacred as they do the letters themselves. Many Christian authors who have handled this subject, though they do not affirm their divine original, nor their extravagant antiquity, pretend, however, that they are the only proper vowels in the language, and regulate and ascertain its true pronunciation. Though they differ from the Jews with respect to the origin of these points, they yet allow them a pretty high antiquity, ascribing them to Ezra and the members of the great synagogue. About the middle of the sixteenth century, however Elias Levita, a learned German Jew, who then flourished at Rome, discovered the delusion, and made it appear that these appendages had never been in use till after the writing of the Talmuds, about 500 years after Christ. This innovation raised Elias a multitude of adversaries, both of his own countrymen and Christians. Among the latter appeared the two Buxtorfs, father and son, who produced some cabbalistical books of great antiquity (at least in the opinion of the Jews), in which there was express mention of the points. The Buxtorfs were answered by Capellus and other critics; till Father Morinus, having examined all that had been urged on both sides, produced his learned dissertation on that subject; against which there has been nothing advanced of any consequence, whilst his work has been universally admired, and his opinion confirmed by those that have beaten the same field after him.

According to the learned father it appears plainly that neither Origen, nor St. Jerome, nor even the compilers of the Talmuds, knew any thing of what have been called the vowel points; and that these books were not finished till the seventh century. Even the Jewish rabbis who wrote during the eighth and ninth centuries, were not in the least acquainted with them. He adds, that the first vestiges he could trace of them were in the writings of rabbi Ben Aber chief of the western, and of rabbi Ben Naphtali chief of the eastern school, that is, about the middle of the tenth century; so that they can hardly be said to be older than the beginning of that period. The Buxtorfs and other learned men have ascribed the invention of the vowel points in question to the rabbis of the school of Tiberias; which flourished about the middle of the second century. This opinion is by no means probable, because it appears plain from history, that before that period all the Jewish seminaries in that province were destroyed, and their heads forced into exile. Some of these retired into Babylonia, and settled at Sora, Naherida, and Pombeditha, where they established famous universities. After this era there remained no more any rabbinical schools in Judea, headed by professors capable of undertaking this difficult operation, nor indeed of sufficient authority to recommend it to general practice, had they been ever so thoroughly qualified for executing it.

Capellus and father Morin, who contend for the late introduction of the vowel points, acknowledge that there can certainly be no language without vocal sounds, which are indeed the soul and essence of speech; but they affirm that the Hebrew alphabet actually contains vowel characters, as well as the Greek and Latin and the alphabets of modern Europe. These are aleph, he, vau, jod, which they call the matres lectionis, or the parents of reading. To these some, and we think very properly, add ain, oin, or ajin. These, they conclude, perform exactly the same office in Hebrew that their descendants do in Greek. It is indeed agreed on all hands that the Greek alphabet is derived

from the Phœnician, which is known to be the same with the Samaritan or Hebrew. Hitherto the analogy is not only plausible, but the resemblance precise. The Hebrews and Samaritans employed these vowels exactly in the same manner as the Greeks; and so all was easy and natural. But the assertors of the Masoretic system maintain that the letters mentioned above are not vowels but consonants or aspirations, or any thing you please but vocal letters. This they endeavour to prove from their use among the Arabians, Persians, and other oriental nations; but to us it appears abundantly strange to suppose that the Greeks pronounced beta, gamma, delta, &c., exactly as the Hebrews and the Phœnicians did, and yet at the same time did not adopt their mode of pronunciation with respect to the five letters under consideration. To this argument we think every objection must yield. The Greeks borrowed their letters from the Phœnicians; these letters were the Hebrew or Samaritan; the Greeks wrote and pronounced all the other letters of their alphabet, except the five in question, in the same manner with their originals of the east; if they did so, it obviously follows that the Greek and oriental office of these letters was the same.

Point-blank, in gunnery, denotes the shot of a piece levelled horizontally, without either mounting or sinking the muzzle. In shooting thus, the bullet is supposed to go in a direct line, and not to move in a curve as bombs and highly elevated random shots do. We say *supposed* to go in a direct line, because it is certain that a shot cannot fly any part of its range in a right line strictly taken: but the greater the velocity, the nearer it approaches to a right line; or the less crooked its range. The French point-blank, or but en blanc, is what the British call the line of metal elevation, which in most guns is from one to two degrees.

Point De Galle, a fortified town in the Island of Ceylon, the third in consequence, is situated sixty miles south from Columbo. The harbour, particularly the outer road, is spacious, and the inner harbour is secure during a great part of the year. Ships outward-bound from Europe generally come in sight of the first land at Dondrahead, the southern promontory of Ceylon, and make Point de Galle their first harbour. There is no regular rainy season, but from its situation at the extremity of the island it has a share of the rain of each coast, which falls in storms at all seasons of the year. The heaviest rain, however, falls between November and February.

Point de Galle is an old Dutch fort out of repair, and not above six English families reside here constantly. The pettah, or native town, is, however, extensive, and superior to those at Trincomalé; in respect to trade it ranks next to Columbo. Fisheries to a considerable extent are carried on, and the fish dried and cured for exportation to the neighbouring continent. Arrack, oil, pepper, cotton, and cardamums, also form its exports. Cinnamon is grown, but not in such quantities as about Columbo: one of the East India ships touches here annually, to carry off what is prepared. Near the fort a colony of Chinese is established as gardeners by the East India Company, for the purpose of raising vegetables. They cultivate esculents of various sorts, and have also thriving plantations of sugar-cane. The mutton here is said to be indifferent; but the beef, poultry, bread, and fish, are excellent. The travelling distance from Columbo is seventy-two miles.

Point of Appui, in military affairs, the point upon which a line of troops is formed. When the right stands in front, and the column is marching to form, the first halted company, division, &c., is the point of appui; and, when the right is in front, the distant point of formation is the left. *Point of intersection* (Fr. *point d'intersection*), the point where two lines intersect each other. *Intermediate point* (Fr. *point intermédiare*). In marching forward that is called an intermediate point which lies between the spot marched from, and the spot towards which you are advancing. In forming line, the centre point between the right and left is the intermediate point. It is of the utmost consequence to every body of troops, advancing or retreating, but especially in advancing towards the enemy, to find an intermediate point between two given, and perhaps inaccessible, objects. The line of march is preserved by these means in its perpendicular direction, and every column may be enabled to ascertain its relative point of entry in the same line. *Point of alignment* (Fr. *point d'alignement*), the point which troops form upon and dress by. *Point of formation*, a point taken, upon which troops are formed in military order.

A perpendicular point is the point upon which troops march in a straight forward direction. *Relative points* are the points by which the parallelism of a march is preserved. *Point of passing*, the ground on which one or more bodies of armed men march by a reviewing general. *Point to salute at*, the spot on which the reviewing general stands. This, however, is not to be understood literally, as every infantry officer, when he arrives within six paces of the general, recovers his sword and drops it, keeping it in that situation until he shall have passed him a prescribed number of paces. The cavalry salute within the breadth of the horse's neck, the instant the object is uncovered. *Point of war*, a loud and impressive beat of the drum, the perfect execution of which requires great skill and activity. The point of war is beat when a battalion charges.

POINTE, in modern music, is a sign of augmentation only, and is placed on the right of a note; it augments by one half the value of every note to which it is attached; thus the pointed semibreve is equal to three minims, or one semibreve and a half; the pointed minim is equal to three crotchets, &c.

Pointer, in zoology. See Canis.

POINTING, in grammar, the art of dividing a discourse, by points, into periods and members of periods, in order to show the proper pauses to be made in reading, and to facilitate the pronunciation and understanding thereof. See Punctuation.

POIRET (Peter), a native of Metz, born in 1646, and educated at Erasmus College Basil. He is chiefly distinguished by his zeal

for Madame Guyon and the Mystic writers. He published several pieces in favor of their tenets, and died in 1719.

POISE, or Poize, *n. s.* & *v. a.* Ital. and Span. *pesa;* Fr. *peser* of Lat. *pondus.* Weight; gravity; balance; equilibrium; any regulating power or force: to balance; hold in equiponderance: weigh; test by a balance; oppress or load with weight.

How nice to couch? how all her speeches *poized* be?
A nymph thus turned but mended in translation.
Sidney.

He fell, as an huge rockie clift,
Whose false foundation waves have washed away
With dreadful *poize* is from the main land reft.
Spenser.

When I have suit,
It shall be full of *poize* and difficulty,
And fearful to be granted.
Shakspeare. Othello.

If the balance of our lives had not one scale of reason to *poize* another of sensuality, the baseness of our natures would conduct us to preposterous conclusions. *Id.*

I'll strive with troubled thoughts to take a nap,
Lest leaden slumber *poize* me down to morrow,
When I should mount with wings of victory.
Shakspeare.

Where an equal *poize* of hope and fear
Does arbitrate the event, my nature is
That I incline to hope. *Milton.*

As the sands
Of Barca or Cyrene's torrid soil,
Levy'd to side with warring winds, and *poize*
Their lighter wings. *Id. Paradise Lost.*

Love is the great leveller which in a manner setteth all things on even ground, and reduceth to a just *poise.* *Barrow.*

Men of an unbounded imagination often want the *poize* of judgment. *Dryden.*

Where could they find another formed so fit,
To *poize* with solid sense a sprightly wit? *Id.*

He cannot sincerely consider the strength, *poize* the weight, and discern the evidence of the clearest argumentations, where they would conclude against his desires. *South.*

'Tis odd to see fluctuation in opinion so earnestly charged upon Luther, by such as have lived half their days in a *poize* between two churches.
Atterbury.

The particles that formed the earth must convene from all quarters towards the middle, which would make the whole compound to rest in a *poize.*
Bentley's Sermons.

POI'SON, *n. s.* & *v. a.*
Poi'soner, *n. s.*
Poi'sonous, *adj.*
Poi'sonously,
Poi'sonousness.
French *poison;* Qu. Lat. *potio, potionatum.* Mr. Thomson says, L. Belg. *piso, poscio,* seem to have been like Ital. *tosco,* and Span. *tosigo* from Gr. *τοξικον,* Lat. *toxicum.*' Venom; whatever destroys life; particularly in a secret or occult manner; hence whatever is malignant, infectious, or deleterous: to poison is to kill, injure, to infect with poison; corrupt; taint: all the other words are regularly derived from poison, noun-substantive.

He was so discouraged, that he *poisoned* himself and died. *2 Mac.*

The other messenger
Whose welcome I perceived had *poisoned* mine.
Shakspeare.

I must be the *poisoner*
Of good Polixenes. *Id.*

Those cold ways,
That seem like prudent helps, are very *poisonous,*
Where the disease is violent. *Id. Coriolanus.*

Themselves were first to do the ill,
Ere they thereof the knowledge could attain;
Like him that knew not *poison's* power to kill,
Until, by tasting it, himself was slain. *Davies.*

Virtue, dear friends, needs no defence,
The surest guard is innocence,
Quivers and bows and *poisoned* darts
Are only used by guilty hearts. *Roscommon*

So many mischiefs were in one combined;
So much one single *poisoner* cost mankind.
Dryden

Not Sirius shoots a fiercer flame,
When with his *poisonous* breath he blasts the sky.
Id.

Notions with which the schools had *poisoned* our youth, and which only served to draw the prince to govern amiss, but proved no security to him, when the people were grown weary of ill government.
Davenant.

One gives another a cup of *poison,* but at the same time tells him it is a cordial, and so he drinks it off and dies. *South.*

Wretches who live upon other men's sins, the common *poisoners* of youth, getting their veiy bread by the damnation of souls. *Id.*

Men more easily pardon ill things done than said, such a peculiar rancour and venom do they leave behind in men's minds, and so much more *poisonously* and incurably does the serpent bite with his tongue than his teeth. *Id.*

Hast thou not
With thy false arts *poisoned* his people's loyalty?
Rowe.

This being the only remedy against the *poison* of sin, we must renew it as often as we repeat our sins, that is, daily. *Duty of Man.*

A lake that has no fresh water running into it, will, by heat, and its stagnation, turn into a stinking rotten puddle, sending forth nauseous and *poisonous* steams. *Cheyne.*

Drink with Walters, or with Chartres eat;
They'll never *poison* you, they'll only cheat.
Pope.

That's just a swatch o' Hornbook's way;
Thus goes he on from day to day,
Thus does he *poison,* kill, an' slay,
An's weel paid for't;
Yet stops me o' my lawfu' prey. *Burns.*

Poison, in medicine, any thing which, whether taken into the stomach or lungs, or introduced by means of a wound or secreting surface, as the rectum, tongue, &c., proves fatal to animal life by an action not mechanical. Most of the substances properly called poisonous are only so in certain doses; for below this point, in the general scale, many of them form the most active and consequently the most valuable medicines of the dispensatory. There are nevertheless some poisons which are deleterious and even fatal in the smallest quantities imaginable, and which are hence never administered medicinally; such are those of hydrophobia and the plague. There are other poisons, again, which are innocent when taken into the stomach, but which prove deleterious when applied to the lungs, or to an abraded surface; thus carbonic acid is continually swallowed with fermented liquors with impunity, and the poison of the viper may be

taken in the same manner; whilst inspiring carbonic acid kills, and the poison of the viper inserted into the flesh often proves fatal.

Our article CHEMISTRY contains a detailed account of most poisons.

When a substance produces disease, not only in mankind but in all animals, it is distinguished by the term common poison, as arsenic, sublimate, &c., whilst that which is poisonous to man only, or to animals, and often to one genus, is said to be a relative poison; thus aloes is poisonous to dogs and wolves; the phellandrium aquaticum kills horses, whilst oxen devour it greedily and with impunity. It appears, then, that substances act as poisons only in regard to their dose, the part of the body they are applied to, and the subject.

Poisons have been arranged in six classes:—

I. *Corrosive or escharotic poisons.*

They are so named because they usually irritate, inflame, and corrode the animal texture with which they come into contact. Their action is in general more violent and formidable than that of the other poisons. The following list from Orfila contains the principal bodies of this class:—

1. Mercurial preparations; corrosive sublimate, red oxide of mercury; turbith mineral, or yellow subsulphate of mercury; pernitrate of mercury; mercurial vapors.

2. Arsenical preparations; such as white oxide of arsenic, and its combinations with the bases, called arsenites; arsenic acid, and the arseniates; yellow and red sulphuret of arsenic; black oxide of arsenic, or fly-powder.

3. Antimonial preparations; such as tartar emetic, or cream tartrate of antimony; oxide of antimony; kermes mineral; muriate of antimony; and antimonial wine.

4. Cupreous preparations; such as verdigris; acetate of copper; the cupreous sulphate, nitrate, and muriate; ammoniacal copper; oxide of copper; cupreous soaps, or grease tainted with oxide of copper; and cupreous wines or vinegars.

5. Muriate of tin.

6. Oxide and sulphate of zinc.

7. Nitrate of silver.

8. Muriate of gold.

9. Pearl-white, or the oxide of bismuth, and the subnitrate of this metal.

10. Concentrated acids; prussic, sulphuric, nitric, phosphoric, muriatic, hydriodic, acetic, &c.

11. Corrosive alkalis; pure or subcarbonated potassa, soda, and ammonia.

12. The caustic earths, lime and barytes.

13. Muriate and carbonate of barytes.

14. Glass and enamel powder.

15. Cantharides.

II. *Astringent poisons.*

1. Preparations of lead, such as the acetate, carbonate, wines sweetened with lead, water impregnated with its oxide, food cooked in vessels containing lead, syrups clarified with subcarbonate of lead, plumbean vapors.

III. *Acrid poisons.*

1. The gases; chlorine, muriatic acid, sulphurous acid, nitrous gas, and nitro-muriatic vapors.

2. Jatropha manihot, the fresh root, and its juice, from which cassava is made.

3. The Indian ricinus, or Molucca wood.

4. Scammony. 5. Gamboge. 6. Seeds of palma Christi. 7. Elaterium. 8. Colocynth. 9. White hellebore root. 10. Black hellebore root. 11. Seeds of stavesacre. 12. The wood and fruit of the ahoväi of Brasil. 13. Rhododendron chrysanthum. 14. Bulbs of colchicum, gathered in summer and autumn. 15. The milky juice of the convolvulus arvensis. 16. Asclepias. 17. Œnanthe fistulosa and crocata. 18. Some species of clematis. 19. Anemone pulsatilla. 20. Root of wolf's-bane. 21. Fresh roots of Arum maculatum. 22. Berries and bark of Daphne Mezereum. 23. The plant and emanations of the rhus toxicodendron. 24. Euphorbia officinalis. 25. Several species of ranunculus, particularly the aquatilis. 26. Nitre, in a large dose. 27. Some muscles and other shell-fish.

IV. *Narcotic and stupefying poisons.*

1. The gases; hydrogen, azote, and oxide of azote.

2. Poppy and opium.

3. The roots of the solanum somniferum; berries and leaves of the solanum nigrum; those of the morel with yellow fruit. 4. The roots and leaves of the atropa mandragora. 5. Datura stramonium. 6. Hyosciamus, or henbane. 7. Lactuca virosa. 8. Paris quadrifolia, or herb Paris. 9. Laurocerasus, or bay laurel and prussic acid. 10. Berries of the yew tree. 11. Ervum ervilia; the seeds. 12. The seeds of lathyrus cicera. 13. Distilled water of bitter almonds. 14. The effluvia of many of the above plants.

V. *Narcotico-acrid poisons.*

1. Carbonic acid; the gas of charcoal stoves and fermenting liquors. 2. The manchineel. 3. Faba Sancti Ignatii. 4. The exhalations and juice of the poison-tree of Macassar, or Upas-Antiar. 5. The ticunas. 6. Certain species of strychnos. 7. The whole plant, Lauro-cerasus. 8. Belladonna, or deadly nightshade. 9. Tobacco. 10. Roots of white bryony. 11. Roots of the chœrophyllum sylvestre. 12. Conium maculatum, or spotted hemlock. 13. Æthusa cynapium. 14. Cicuta virosa. 15. Anagalis arvensis. 16. Mercurialis perennis. 17. Digitalis purpurea. 18. The distilled waters and oils of some of the above plants. 19. The odorant principle of some of them. 20. Woorara of Guiana. 21. Camphor. 22. Cocculus Indicus. 23. Several mushrooms; see AGARICUS, and BOLETUS. 24. Secale cornutum. 25. Lolium temulentum. 26. Sium latifolium. 27. Coriaria myrtifolia.

VI. *Septic or putrescent poisons.*

1. Sulphureted hydrogen. 2. Putrid effluvia of animal bodies. 3. Contagious effluvia, or fomites and miasmata. 4. Venomous animals; the viper, rattlesnake, scorpion, mad dog, &c.

M. Drapiez has ascertained, by numerous experiments, that the fruit of the feuille a cordifolia is a powerful antidote against vegetable poisons. He poisoned dogs with the rhus toxicodendron, hemlock, and nux vomica; and all those which were left to the effects of the poison died, but those to which the above fruit was administered recovered completely, after a short illness. To see whether the antidote would act in the same way, applied externally to wounds into which

vegetable poisons had been introduced, he took two arrows, which had been dipped into the juice of the manchenille, and slightly wounded with them two cats; to one of these wounds he applied a poultice, composed of the fruit of the feuillea cordifolia, while the other was left without any application. The former suffered no inconvenience, except from the pain of the wound, which speedily healed; while the other, in a short time, fell into convulsions, and died. This fruit loses these valuable virtues if kept two years after it is gathered.

Dr. Lyman Spalding of New York announces in a small pamphlet that, for above these fifty years, the scutellaria lateriflora has proved to be an infallible means for the prevention and cure of the hydrophobia, after the bite of rabid animals. It is better applied as a dry powder than fresh. According to the testimonies of several American physicians, this plant, not yet received as a remedy into any European materia medica, afforded perfect relief in above 1000 cases, as well in the human species as in the brute creation (dogs, swine, and oxen).—Philosophical Magazine.

When sudden death is suspected to have been occasioned by the administration of poison, either wilfully or by accident, the testimony of the physician is occasionally required to confirm or invalidate this suspicion. He may also be sometimes called upon to ascertain the cause of the noxious effects arising from the presence of poisonous substances in articles of diet; and it may, therefore, serve an important purpose to point out concisely the simplest and most practicable modes of obtaining, by experiment, the necessary information.

The only poisons, however, that can be clearly and decisively detected by chemical means are those of the mineral kingdom. Arsenic, and corrosive sublimate, are most likely to be exhibited with the view of producing death; and lead and copper may be introduced undesignedly, in several ways, into our food and drink. The continued and unsuspected operation of the two last may often produce effects less sudden and violent, but not less baneful to health and life, than the more active poisons; and their operation generally involves, in the pernicious consequences, a greater number of sufferers.

When the cause of sudden death is believed, from the symptoms preceding it, to be the administration of arsenic, the contents of the stomach must be attentively examined. To effect this let a ligature be made at each orifice, the stomach removed entirely from the body, and its whole contents washed out into an earthen or glass vessel. The arsenic, on account of its greater specific gravity, will settle to the bottom, and may be obtained separate, after washing off the other substances by repeated effusions of cold water. These washings should not be thrown away till the presence of arsenic has been clearly ascertained. It may be expected at the bottom of the vessel in the form of a white powder, which must be carefully collected, dried on a filter, and submitted to experiment.

Boil a small portion of the powder with a few ounces of distilled water, in a clean Florence flask, and filter the solution.

To this solution add a portion of water, saturated with sulphureted hydrogen gas. If arsenic be present, a golden yellow sediment will fall down, which will appear sooner if a few drops of acetic acid be added.

A similar effect is produced by the addition of sulphuret of ammonia, or hydro-sulphuret of potassa.

It is necessary, however, to observe, that these tests are decomposed not only by all metallic solutions, but by the mere addition of any acid.

The sediments produced by any of the foregoing experiments may be collected, dried, and laid on red hot charcoal. A smell of sulphur will first arise, and will be followed by that of garlic.

A process for detecting arsenic was proposed by a Mr. Hume of Long-Acre. The test which he has suggested is the fused nitrate of silver or lunar caustic, which he employs in the following manner:—

Into a clean Florence oil-flask introduce two or three grains of any powder suspected to be arsenic; add not less than eight ounce measures of either rain or distilled water; and heat this gradually over a lamp, or a clear coal fire, till the solution begins to boil. Then, while it boils, frequently shake the flask, which may be readily done by wrapping a piece of leather round its neck, or putting a glove upon the hand. To the hot solution add a grain or two of subcarbonate of potassa or soda, agitating the whole to make the mixture uniform.

In the next place, pour into an ounce phial, or a small wine-glass, about two table spoonsful of this solution, and present, to the mere surface of the fluid, a stick of dry nitrate of silver or lunar caustic. If there be any arsenic present, a beautiful yellow precipitate will instantly appear; which will proceed from the point of contact of the nitrate with the fluid, and settle towards the bottom of the vessel as a flocculent and copious precipitate.

The nitrate of silver, Hume finds, also, acts very sensibly upon arseniate of potassa, and decidedly distinguishes this salt from the above solution or arsenite of potassa; the color of the precipitate, occasioned by the arseniate, being much darker and more inclined to brick-red. In both cases, he is of opinion that the test of nitrate of silver is greatly superior to that of sulphate of copper; inasmuch as it produces a much more copious precipitate, when equal quantities are submitted to experiment. The tests he recommends to be employed in their dry state, in preference to that of solution; and that the piece of salt be held on the surface only.

A modified application of this test has since been proposed by Dr. Marcet, whose directions are as follow:—Let the fluid, suspected to contain arsenic, be filtered; let the end of a glass rod, wetted with a solution of pure ammonia, be brought into contact with this fluid, and let the end of a clean rod, similarly wetted with solution of nitrate of silver, be immersed in the mixture. If the minutest quantity of arsenic be present, a precipitate of a bright yellow color, inclining to orange, will appear at the point of contact, and will readily subside to the bottom of the vessel. As this precipitate is soluble in am-

monia, the greatest care is necessary not to add an excess of that alkali. The acid of arsenic, with the same test, affords a brick-red precipitate. —Hume, it may be added, now prepares his test by dissolving a few grains, say ten, of lunar caustic in nine or ten times its weight of distilled water; precipitating by liquid ammonia; and adding cautiously, and by a few drops at once, liquid ammonia, till the precipitate is re-dissolved, and no longer. To obviate the possibility of any excess of ammonia, a small quantity of the precipitate may be left undissolved. To apply this test, nothing more is required than to dip a rod of glass into this liquor, and then touch with it the surface of a solution supposed to contain arsenic, which will be indicated by a yellow precipitate.

Sylvester has objected to this test, that it will not produce the expected appearance, when common salt is present. He has, therefore, proposed the red acetate of iron as a better test of arsenic, with which it forms a bright yellow deposit; or the acetate of copper, which affords a green precipitate. Of the two, he recommends the latter in preference, but advises that both should be resorted to in doubtful cases. Dr. Marcet, however, has replied, that the objection arising from the presence of common salt is easily obviated; for if a little diluted nitric acid be added to the suspected liquid and then nitrate of silver very cautiously till the precipitate ceases, the muriatic acid will be removed, but the arsenic will remain in solution, and the addition of ammonia will produce the yellow precipitate in its characteristic form. It is scarcely necessary to add that the quantity of ammonia must be sufficient to saturate any excess of nitric acid which the fluid may contain.

A more important objection to nitrate of silver as a test of arsenic is that it affords, with the alkaline phosphates, a precipitate of phosphate of silver, scarcely distinguishable by its color from the arseniate of that metal. In answer to this, it is alleged by Hume, that the arsenite of silver may be discriminated by a curdy or flocculent figure, resembling that of fresh precipitated muriate of silver, except that its color is yellow; while the phosphate is smooth and homogeneous. The better to discriminate these two arsenites, he advises two parallel experiments to be made, upon separate pieces of clean writing paper, spreading on the one a little of the fresh prepared arsenite, and on the other a little of the phosphate. When these are suffered to dry, the phosphate will gradually assume a black color, or nearly so, while the arsenite will pass from its original vivid yellow to an Indian yellow, or nearly a fawn color.

Dr. Paris conducts the trial in the following manner:—Drop the suspected fluid on a piece of white paper, making with it a broad line; along this line a stick of lunar caustic is to be slowly drawn several times successively, when a streak will appear of the color resembling that known by the name of Indian yellow. This is equally produced by arsenic and by an alkaline phosphate, but the one from arsenic is rough, curdy, and flocculent, like that from a crayon; that from a phosphate is homogeneous and uniform, resembling a water color laid smoothly on with a brush. But a more important and distinctive peculiarity soon succeeds; for in less than two minutes the phosphoric yellow fades into a sap green, and becomes gradually darker, and ultimately quite black, while on the other hand the arsenic yellow continues permanent, or nearly so, for some time, and then becomes brown. In performing this experiment, the sunshine should be avoided, or the change of color will take place too rapidly. (Ann. of Phil. x. 60). The author of the London Dispensatory adds, that the test is improved by brushing the streak lightly over with liquid ammonia immediately after the application of the caustic, when, if arsenic be present, a bright queen's yellow is produced, which remains permanent for nearly an hour; but that when lunar caustic produces a white yellow before the ammonia is applied, we may infer the presence of some alkaline phosphate rather than of arsenic.

Smithson proposes to fuse any powder suspected to contain arsenic with nitre; this produces arseniate of potassa, of which the solution affords a brick-red precipitate with nitrate of silver. In cases where any sensible portion of the alkali of the nitre has been set free, it must be saturated with acetous acid, and the saline mixture dried and re-dissolved in water. So small is the quantity of arsenic required for this mode of trial, that a drop of solution of oxide of arsenic in water (which at 54° of Fahrenheit may be estimated to contain one-eightieth its weight of the oxide), mixed with a little nitrate of potassa, and fused in a platinum spoon, affords a very sensible quantity of arseniate of silver. (Ann. of Phil. N. S. iv. 127).

Dr. Cooper, president of Colombia College, finds a solution of chromate of potassa to be one of the best tests of arsenic. One drop is turned green by the fourth of a grain of arsenic, by two or three drops of Fowler's mineral solution, or any other arsenite of potassa. The arsenious acid takes oxygen from the chromic, which is converted into oxide of chrome. To exhibit the effect, take five watch-glasses; put on one, two or three drops of a watery solution of white arsenic; on the second, as much arsenite of potassa; on the third, one-fourth of a grain of white arsenic in substance; on the fourth, two or three drops of a solution of corrosive sublimate; on the fifth, two or three drops of a solution of copper. Add to each three or four drops of a solution of chromate of potassa. In half an hour a bright clear grass-green color will appear in numbers one, two, three, unchangeable by ammonia; number four will instantly exhibit an orange precipitate; and number five a green, which a drop of ammonia will instantly change to blue. (Silliman's American Journal, iii).

But the most decisive mode of determining the presence of arsenic (which, though not absolutely indispensable, should always be resorted to, when the suspected substance can be obtained in sufficient quantity), is by reducing it to a metallic state; for its characters are then clear and unequivocal. For this purpose, let a portion of the white sediment, collected from the contents of the stomach, be dried and mixed with three

times its weight of black flux; or, if this cannot be procured, with two parts of very dry carbonate of potassa (the salt of tartar of the shops), and one of powdered charcoal. Dr. Bostock finds that, for this mixture, we may advantageously substitute one composed of half a grain of charcoal, and two drops of oil, to a grain of the sediment. Procure a tube eight or nine inches long, and one-fourth or one-sixth of an inch in diameter, of thin glass, sealed hermetically at one end. Then put into the tube the mixture of the powder and its flux, and, if any should adhere to the inner surface, let it be wiped off by a feather, so that the inside of all the upper part of the tube may be quite clean and dry. Stop the end of the tube loosely, with a little paper, and heat the sealed end only, on a chafing-dish of red-hot coals, taking care to avoid breathing the fumes. The arsenic, if present, will rise to the upper part of the tube, on the inner surface of which it will form a thin brilliant coating. Break the tube, and scrape off the reduced metal. Lay a little on a heated iron, when if it be arsenic, a dense smoke will arise, and a strong smell of garlic will be perceived. The arsenic may be farther identified, by putting a small quantity between two polished plates of copper, surrounding it by powdered charcoal, to prevent its escape, binding these tightly together by iron wire, and exposing them to a low red heat. If the included substance be arsenic, a white stain will be left on the copper.

It may be proper to observe that neither the stain on copper, nor the odor of garlic, is produced by the white oxide of arsenic, when heated without the addition of some inflammable ingredient. The absence of arsenic must not, therefore, be inferred, if no smell should be occasioned by laying the white powder on heated iron.

Dr. Black ascertained that all the necessary experiments, for the detection of arsenic, may be made on a single grain of the white oxide; this small quantity having produced, when heated in a tube with its proper flux, as much of the metal as clearly established its presence. If the quantity of arsenic in the stomach should be so small, which is not very probable, as to occasion death, and yet to remain suspended in the washings, the whole contents, and the water employed to wash them, must be filtered, and the clear liquor assayed for arsenic by the tests. In this case it is necessary to be careful that the color of the precipitate is not modified by that of the liquid found in the stomach. If this be yellow, the precipitate by sulphate of copper and carbonate of potassa will appear green, even though no arsenic be present; but on leaving it to settle, decanting off the fluid, and replacing it with water, it will evidently be blue without any tinge of green, being no longer seen through a yellow medium. The liquid contents of the stomach may also be evaporated to dryness below 250° Fahrenheit, and the dry mass be exposed to heat at the bottom of a Florence flask, to sublime the arsenic. If dissolved in an oily fluid, Dr. Ure proposes to boil the solution with distilled water and afterwards to separate the oil by the capillary action of wick threads. The watery fluid may then be subjected to the usual tests.

M. Orfila has gone into ample details on the modifications produced by wine, coffee, tea, broth, &c., on arsenical tests, of which a good tabular abstract is given in Mr. Thomson's London Dispensatory. But it is evident that the differences in these menstrua, as also in beers, are so great as to render precipitations and changes of color by reagents very unsatisfactory witnesses, in a case of life and death. Hence the method of evaporation above described should never be neglected. Should the arsenic be combined with oil, the mixture ought to be boiled with water, and the oil then separated by the capillary action of wick-threads. If with resinous substances, these may be removed by oil of turpentine, not by alcohol (as directed by Dr. Black), which is a good solvent of arsenious acid. It may moreover be observed that both tea and coffee should be freed from their tannin by gelatin, which does not act on the arsenic, previous to the use of reagents for the poison. When one part of arsenious acid in watery solution is added to ten parts of milk, the sulphureted hydrogen, present in the latter, occasions the white color to pass into a canary yellow; the cupreous test gives it a slight green tint, and the nitrate of silver produces no visible change, though even more arsenic be added; but the hydrosulphurets throw down a golden yellow, with the aid of a few drops of an acid. The liquid contained in the stomach of a rabbit poisoned with a solution of three grains of arsenious acid afforded a white precipitate with nitrate of silver, grayish-white with lime-water, green with the ammoniaco-sulphate, and deep yellow with sulphureted hydrogen water.

The preceding copious description of the habitudes of arsenious acid in different circumstances is equally applicable to the soluble arsenites. Their poisonous operation, as well as that of the arsenic acid, has been satisfactorily referred by Mr. Brodie to the suspension of the functions of the heart and brain, occasioned by the absorption of these substances into the circulation, and their consequent determination to the nervous system and the alimentary canal. This proposition was established by numerous experiments on rabbits and dogs. Wounds were inflicted, and, arsenic being applied to them, it was found that in a short time death supervened, with the same symptoms of inflammation of the stomach and bowels as if the poison had been swallowed.

He divides the morbid affections into three classes: 1st, Those depending on the nervous system, as palsy at first of the posterior extremities, and then of the rest of the body, convulsions, dilatation of the pupils, and general insensibility: 2d, Those which indicate disturbance in the organs of circulation; for example, the feeble, slow, and intermitting pulse, weak contractions of the heart immediately after death, and the impossibility of prolonging them, as may be done in sudden deaths from other causes, by artificial respiration: 3d, Lastly, Those which depend on lesion of the alimentary canal, as the pains of the abdomen, nauseas, and vomitings, in those animals which were suffered to vomit. At one time it is the nervous system that is most

remarkably affected, and at another the organs of circulation. Hence inflammation of the stomach and intestines ought not to be considered as the immediate cause of death, in the greater number of cases of poisoning by arsenic. However, should an animal not sink under the first violence of the poison, if the inflammation has had time to be developed, there is no doubt that it may destroy life.' Mr. Earle states that a woman who had taken arsenic resisted the alarming symptoms which at first appeared, but died on the fourth day. On opening her body the mucous membrane of the stomach and intestines was ulcerated to a great extent. Authentic cases of poison are recorded where no trace of inflammation was perceptible in the primæ viæ.

The effects of arsenic have been graphically represented by Dr. Black :—'The symptoms produced by a dangerous dose of arsenic begin to appear in a quarter of an hour, or not much longer, after it is taken. First sickness, and great distress at stomach, soon followed by thirst, and burning heat in the bowels. Then come on violent vomiting, and severe colic pains, and excessive and painful purging. This brings on faintings, with cold sweats, and other signs of great debility. To this succeed painful cramps, and contractions of the legs and thighs, and extreme weakness and death.' Similar results have followed the incautious sprinkling of schirrous ulcers with powdered arsenic, or the application of arsenical pastes. The following more minute specification of symptoms is given by Orfila:—'An austere taste in the mouth; frequent ptyalism; continual spitting; constriction of the pharynx and œsophagus; teeth set on edge; hiccups; nausea; vomiting of brown or bloody matter; anxiety; frequent fainting fits; burning heat at the prœcordia; inflammation of the lips, tongue, palate, throat, stomach; acute pain of stomach, rendering the mildest drinks intolerable; black stools of an indescribable fœtor; pulse frequent, oppressed and irregular, sometimes slow and unequal; palpitation of the heart; syncope; unextinguishable thirst; burning sensation over the whole body, resembling a consuming fire; at times an icy coldness; difficult respiration; cold sweats; scanty urine, of a red or bloody appearance; altered expression of countenance; a livid circle round the eyelids; swelling and itching of the whole body, which becomes covered with livid spots, or with a miliary eruption; prostration of strength; loss of feeling, especially in the feet and hands; delirium; convulsions, sometimes accompanied with an insupportable priapism; loss of the hair; separation of the epidermis; horrible convulsions; and death.'

It is uncommon to observe all these frightful symptoms combined in one individual; sometimes they are altogether wanting, as is shown by the following case, related by M. Chaussier: —A robust man of middle age swallowed arsenious acid in large fragments, and died without experiencing other symptoms than slight syncopes. On opening his stomach, it was found to contain the arsenious acid in the very same state in which he had swallowed it. There was no appearance whatever of erosion or inflammation in the intestinal canal. Etmuller mentions a young girl's being poisoned by arsenic, and whose stomach and bowels were sound to all appearance, though the arsenic was found in them. In general, however, inflammation does extend along the whole canal, from the mouth to the rectum. The stomach and duodenum present frequently gangrenous points, eschars, perforations of all their coats; the villous coat in particular, by this and all other corrosive poisons, is commonly detached, as if it were scraped off or reduced into a paste of a reddish-brown color. From these considerations we may conclude, that from the existence or non-existence of intestinal lesions, from the extent or seat of the symptoms alone, the physician should not venture to pronounce definitely on the fact of poisoning.

The result of Mr. Brodie's experiments on brutes teaches that the inflammations of the intestines and stomach are more severe when the poison has been applied to an external wound, than when it has been thrown into the stomach itself.

Corrosive sublimate (the bichloride or oxymuriate of mercury), next to arsenic, is the most virulent of the metallic poisons. It may be collected by treating the contents of the stomach in the manner already described; but as it is more soluble than arsenic, viz. in about nineteen times its weight of water, no more water must be employed than is barely sufficient, and the washings must be carefully preserved for examination. If a powder should be collected, by this operation, which proves, on examination, not to be arsenic, it may be known to be corrosive sublimate by the following characters:—

Expose a small quantity of it, without any admixture, to heat in a coated glass tube, as directed in the treatment of arsenic. Corrosive sublimate will be ascertained by its rising to the top of the tube, lining the inner surface in the form of a shining white crust.

Dissolve another portion in distilled water; and it may be proper to observe how much of the salt the water is capable of taking up.

To the watery solution add a little lime-water. A precipitate of an orange-yellow color will instantly appear.

To another portion of the solution add a single drop of a dilute solution of subcarbonate of potassa (salt of tartar). A white precipitate will appear; but, on a still further addition of alkali, an orange-colored sediment will be formed.

The carbonate of soda has similar effects.

Sulphureted water throws down a dark-colored sediment, which, when dried and strongly heated, is wholly volatilised without any odor of garlic.

For the detection of corrosive sublimate, Sylvester has recommended the application of galvanism, which exhibits the mercury in a metallic state. A piece of zinc wire, or, if that cannot be had, of iron wire, about three inches long, is to be twice bent at right angles, so as to resemble the Greek letter Π. The two legs of this figure should be distant about the diameter of a common gold wedding-ring from each other, and the two ends of the bent wire must afterwards be tied to a ring of this description. Let a plate of

glass, not less than three inches square, be laid as nearly horizontal as possible, and on one side drop some sulphuric acid, diluted with about six times its weight of water, till it spreads to the size of a halfpenny. At a little distance from this, towards the other side, next drop some of the solution supposed to contain corrosive sublimate, till the edges of the two liquids join together; and let the wire and ring, prepared as above, be laid in such a way that the wire may touch the acid, while the gold ring is in contact with the suspected liquid. If the minutest quantity of corrosive sublimate be present, the ring in a few minutes will be covered with mercury on the part which touched the fluid.

Smithson remarks that all the oxides and saline compounds of mercury, if laid in a drop of marine acid on gold, with a bit of tin, quickly amalgamate the gold. In this way a very minute quantity of corrosive sublimate, or a drop of its solution, may be tried, and no addition of muriatic acid is then required. Quantities of mercury may thus be rendered evident which could not be so by any other means. Even the mercury of cinnabar may be exhibited; but it must previously be boiled with a little sulphuric acid in a platinum spoon, to convert it into sulphate. An exceedingly minute quantity of metallic mercury in any powder may be discovered by placing it in nitric acid on gold, drying, and adding muriatic acid and tin.

The only mineral poison of great virulence that has not been mentioned, and which, from its being little known to act as such, it is very improbable we should meet with, is the carbonate of baryta. This, in the country where it is found, is employed as a poison for rats, and there can be no doubt would be equally destructive to human life. It may be discovered by dissolving it in muriatic acid, and by the insolubility of the precipitate which this solution yields on adding sulphuric acid, or sulphate of soda. Soluble barytic salts, if these have been the means of poison, will be contained in the water employed to wash the contents of the stomach, and will be detected, on adding sulphuric acid, by a copious precipitate.

It may be proper to observe that the failure of attempts to discover poisonous substances in the alimentary canal after death is by no means a sufficient proof that death has not been occasioned by poison. For it has been clearly established, by experiments made on animals, that a poison may be so completely evacuated that no traces of it shall be found, and yet that death may ensue from the morbid changes which it has occasioned in the alimentary canal, or in the general system.

Copper and lead sometimes gain admission into articles of food, in consequence of the employment of kitchen utensils of these materials.

1. If copper be suspected in any liquor its presence will be ascertained by adding a solution of pure ammonia, which will strike a beautiful blue color. If the solution be very dilute it may be concentrated by evaporation; and, if the liquor contain a considerable excess of acid, like that used to preserve pickles, as much of the alkali must be added as is more than sufficient to saturate the acid. In this, and all other experiments of the same kind, the fluid should be viewed by reflected, and not by transmitted light.

If into a newly prepared tincture of guaiacum wood we drop a concentrated solution of a salt of copper, the mixture instantly assumes a blue color. This effect does not take place when the solution is very weak, for example when there is not above half a grain of the salt to an ounce of water; but then, by the addition of a few drops of prussic acid, the blue color is instantly developed of great purity and intensity. This color is not permanent, but soon passes to a green, and at length totally disappears. For want of prussic acid, distilled laurel water may be employed. The test produces its effect, even when the proportion of the salt of copper to the water does not exceed 1-45000th. In this minute proportion no other test, whether the prussiate of potassa, soda, or ammonia, gives the least indication of copper.

2. Lead is occasionally found, in sufficient quantity to be injurious to health, in water that has passed through leaden pipes, or been kept in leaden vessels, and sometimes even in pump water, in consequence of that metal having been used in the construction of the pump. Acetate of lead has also been known to be fraudulently added to bad wines, with the view of concealing their defects.

Lead may be discovered by adding, to a portion of the suspected water, about half its bulk of water impregnated with sulphureted hydrogen gas. If lead be present it will be manifested by a dark brown, or blackish, tinge. This test is so delicate that water condensed by the leaden worm of a still tub is sensibly affected by it. Lead is also detected by a similar effect ensuing on the addition of sulphuret of ammonia, or potassa.

For discovering the presence of lead in wine, a test invented by Dr. Hahnemann, and known by the title of Hahnemann's wine test, may be employed. This test is prepared by putting together, into a small phial, sixteen grains of sulphuret of lime, prepared in the dry way (by exposing to a red heat, in a covered crucible, equal weights of powdered lime and sulphur, accurately mixed), and twenty grains of bitartrate of potassa (cream of tartar). The phial is to be filled with water, well corked, and occasionally shaken for the space of ten minutes. When the powder has subsided decant the clear liquor, and preserve it in a well-stopped bottle for use. The liquor, when fresh prepared, discovers lead by a dark colored precipitate. A farther proof of the presence of lead in wines is the occurrence of a precipitate on adding a solution of the sulphate of soda. Sylvester has proposed the gallic acid as an excellent test of the presence of lead. The quantity of lead which has been detected, in sophisticated wine, may be estimated at forty grains of the metal in every fifty gallons. When a considerable quantity of acetate of lead has been taken into the stomach (as sometimes, owing to its sweet taste, happens to children,) after the exhibition of an active emetic, the hydrosulphuret of potassa or of ammonia may be given; or pro-

bably a solution of sulphate of soda (Glauber's salt) would render it innoxious.

The following tests of arsenic and corrosive sublimate have been lately proposed by Brugnatelli:—Take the starch of wheat boiled in water until it is of a proper consistence, and recently prepared; to this add a sufficient quantity of iodine to make it of a blue color; it is afterwards to be diluted with pure water until it becomes of a beautiful azure. If to this some drops of a watery solution of arsenic be added, the color changes to a reddish hue, and finally vanishes. The solution of corrosive sublimate, poured into iodine and starch, produces almost the same change as arsenic; but if, to the fluid acted on by the arsenic, we add some drops of sulphuric acid, the original blue color is restored with more than its original brilliancy, while it does not restore the color to the corrosive sublimate mixture.

POISONNIER (Peter Isaac), M. D., was born at Dijon in 1720, and in 1746 succeeded M. Dubois as professor of physic in the college de France. In 1758 he was first physician to the French army, and was called into Russia, to attend the empress Elizabeth. Here he assisted at the famous experiment relative to the congelation of quicksilver, of which he afterwards gave an account to the Academy of Sciences. He was made, on his return to France, counsellor of state and inspector-general of physic; and received a pension of 12,000 livres for his discovery of distilling fresh from sea-water. During the ascendancy of Robespierre he was imprisoned; but released on his death, and died in 1797 or 1798. He wrote several treatises on the maladies of seamen, the West India fever, &c.

POITIERS, Limonum, a large and very ancient city, the principal place of the department of the Vienne, France, with a population of 21,000 inhabitants: having a royal court for the departments of the Vienne, the Lower Charente, the Two Sèvres and the Vendée, an inferior court of justice, a chamber of commerce and manufactures, an agricultural society, a university academy, a faculty of law, a royal college, a free drawing school, and medical, chemical, and pharmaceutical courses of lectures. This city stands in a picturesque situation, on the side of a steep hill, surrounded by lofty rocks, at the confluence of the Boivre and the Clain, which almost surround it. It is encircled with ancient walls, flanked with towers at intervals, and is in general badly built; the streets are narrow, close, and very steep, but the appearance of the place is pleasant. The public walk of Pont-Guillon, which occupies the interval between the two rivers; the old towers, the ruins, still imposing, of the gothic castle which once stood here; the beautiful verdant carpet, through which the limpid streams wander, watering the majestic alleys of the boulevards; the whole view, in short, of the town, which rises in an amphitheatre, is one of the most delightful in France.

Poitiers was a place of some note in the time of the Romans, who adorned it with an amphitheatre and an aqueduct. In 1356 king John lost under its walls the fatal battle, which cost him his liberty; and the English carried him into England, where they kept him prisoner. During the wars against the English, Charles VII. transferred the parliament of Paris hither for some time; in 1569 admiral Coligny laid siege to it; and since that time its ancient castle has been almost razed to the ground. In this city the unfortunate Urbain Grandier was tried, condemned, and burnt alive, accused of having bewitched the nuns of Loudun. It was in an age renowned for its intelligence and for the great men that have flourished in it; the very time, in fact, of the foundation of the French Academy, that this juridical assassination was perpetrated, and which was only equalled by the punishment of the young chevalier de la Barre 132 years after.

Here are manufactories of coarse cloth, woollen counterpanes, caps, vinegar, starch, earthenware, playing cards, harnessing, carriages, &c.; also linen bleaching grounds, paper mills, dye-houses, tanyards, &c. The inhabitants carry on a trade in corn, wine, brandy, vinegar, wool, hemp, flax, honey, wax, skins, iron, &c. There is a departmental nursery here, and races from the 18th to the 20th of May, for thirty-two departments.

Among the public institutions may be mentioned the library containing 12,000 volumes, the cabinet of natural history and philosophy, the botanic garden, the assembly room, the public walk, one of the finest and pleasantest in France, from which there is a delightful view, the baths, and the cathedral, built in the eleventh century, one of the finest specimens of gothic architecture. At a short distance from this city is an enormous stone raised above the ground supposed to be a monument of the Celtic times. The ancient province of Poitou presents many stones of this description, but this is the most remarkable; it is about twenty feet long, by seventeen broad, and three feet thick, supported by a single pillar. Poitiers is ninety miles south of Tours, eighty-seven north-west of Limoges, ninety-three north of Angoulême, 105 E. N. E. of Rochelle, and 265 south-west of Paris.

POITOU, the name, before the revolution, of a province of France, bounded by Anjou on the north, Saintonge on the south, and the ocean on the west. It was divided into Upper and Lower Poitou, and was about 210 miles in length, by seventy in breadth. It is now divided into the departments of La Vienne, Deux Sèvres, and La Vendée. See these departments.

POIVRE (N.), a celebrated French botanist and traveller, born at Lyons in 1715. He studied in the Missionary Congregation at Paris, and then went to China, where he was imprisoned two years, after which he went to Cochin China. In 1745 he returned to France; and afterwards went to the East Indies; but the ship in which he sailed was taken on the passage by the British, and carried into Batavia; where he made many observations, before he returned to Paris. In 1749 he was appointed envoy from Louis XV. to the king of Cochin China, for the purpose of opening a commercial intercourse with that country. He resided several years in various parts of the East, and returned to Paris,

where he died in 1786. He published his travels, under the title of a Voyage of a Philosopher, in 12mo.

POKE, *n. s.* Sax. þocca; Fr. *poche.* A pocket; small bag; pouch.

> Gervais answered, certes were it gold,
> Or in a *poke* nobles all untold,
> Thou shouldest it have. *Chaucer.*

> I will not buy a pig in a *poke.*
> *Camden's Remains.*

> She suddenly unties the *poke,*
> Which out of it sent such a smoke,
> As ready was them all to choke,
> So grievous was the pother.
> *Drayton's Nymphid.*

My correspondent writes against master's gowns and *poke* sleeves. *Spectator.*

PO'KE, *v. a.* }
PO'KER, *n. s.* } Swed. *poka, puk,* a stake.
PO'KING-STICK. } To feel in the dark; to search any thing with a long instrument; the iron bar with which we stir the fire; an instrument anciently made use of to adjust the plaits of the ruffs which were then worn.

Your ruff must stand in print, and for that purpose get *poking-sticks* with fair long handles, lest they scorch your hands.
Middleton's Blurt Master Constable, a Comedy, 1602.

> Gloves, as sweet as damask roses,
> Masks for faces, and for noses;
> Bugle bracelet, necklace amber,
> Perfume for a lady's chamber;
> Golden quoifs, and stomachers,
> For my lads to give their dears;
> Pins and *poking-sticks* of steel,
> What maids lack from head to heel.
> *Shakspeare. Winter's Tale.*

If these presumed eyes be clipped off, they will make use of the protrusions or horns, and *poke* out their way as before. *Browne.*

If the *poker* be out of the way, stir the fire with the tongs. *Swift.*

POL DE ST. LEON, a manufacturing town in the department of Finisterre, France, near the sea, and situated on an eminence. Its manufactures are leather and pottery; and it has a considerable trade in the linen and horses of the adjacent country. Population 5500. Twelve miles north-west of Morlain, and thirty-four north-east of Brest.

POLA, an ancient city of Italy, in the south part of Istria, with a citadel and bishop's see. It is seated on a hill near a deep bay of the Adriatic, forty-four miles south of Trieste. It was originally founded by the Colchians, and afterwards made a Roman colony, and named Pietas Julia. (Plin. iii. 9; Mela, ii. 3; Strabo, i. & v.) It has still the remains of a Roman amphitheatre, and a triumphal arch.

POLA, in ichthyology, a flat fish, resembling the soal, but somewhat shorter and smaller, called also cynoglossus and linguatula. It abounds in the Mediterranean, and is sold both in Rome and in Venice for the table.

POLA, an ancient town, formerly a considerable city of Austrian Illyria, in the peninsula of Istria, on the gulf of Venice. It is still a bishop's see; but its population is dwindled down to a tenth of what it was in the time of the Romans, i.e. not above 1000. Its harbour, however, is large and excellent.

POLACHIA, a ci-devant palatinate of Poland, now annexed to Prussia. It was bounded on the north by Prussia and Lithuania; on the east by Lithuania: south by Lublin, and west by Masovia. It is eighty-eight miles long, and thirty broad.

POLACRE, a ship with three masts, usually navigated in the Levant and other parts of the Mediterranean. These vessels are generally furnished with square sails upon the main-mast, and lateen sails upon the fore and mizen masts. Some of them, however, carry square sails upon all the three masts, particularly those of the ci-devant Provence in France. Each mast is commonly formed of one piece, so that they have neither top-mast nor top-gallant-mast; neither have they any horses to their yards, because the men stand upon the top-sail-yard to loose or furl the top-gallant-sail, and on the lower-yard to reef, loose, or furl, the top-sail, whose yard is lowered sufficiently down for that purpose.

POLAND.

POLAND, an extensive country of Central Europe, part of the ancient Sarmatia, is bounded on the north and east by Russia; on the south by Hungary, Walachia, and Moldavia; on the west by Prussia and other German states. No other European territory has undergone such extensive changes of sovereignty. At the end of the fourteenth century, on the annexation of Lithuania, it contained an area of 284,000 square miles, or was nearly one-third larger than France. It was then divided into the provinces of Great and Little Poland Proper; Macovia and Podlachia; Volhynia, Podalia, and the Ukraine. North-east extended the great duchy of Lithuania. The palatinates were at this time thirty-one in number. Perhaps at the present time this whole territory does not contain more than 15,000,000 of inhabitants.

STATISTICS.—On the final partition of this country, in 1795, the distribution of the inhabitants was about as follows:—

	Sq. Miles.	Population.
To Austria	64,000	4,800,000
To Prussia	52,000	3,500,000
To Russia	168,000	6,700,000
	284,000	15,000,000

	Sq. Miles.	Population.
In 1807, at the peace of Tilsit, Prussia ceded above two-thirds of her acquisitions; but the portion restored to her by the Vienna congress in 1815, joined to what she had not ceded, gives her at present a Polish territory of	29,000	1,800,000
Austria was obliged in 1809 to cede part of her acquisitions; and, recovering only a small portion in 1815, her present Polish possessions consist of . (This is exclusive of the Buckowine, a conquest from Turkey.)	30,000	3,500,000
The separate state, called the kingdom of Poland, governed by the czar, contains . . .	47,000	2,800,000
Russia has made no cessions; her share, as it stood in 1795, increased by some subsequent acquisitions; in particular, a district of Prussian Poland, acquired in 1807, comprises about . .	178,000	6,900,000
Total	284,000	15,000,000

The Prussian part of this territory lies to the north-west, the Austrian south, the new kingdom of Poland central, while the acquisitions annexed to the Russian empire (larger than all the rest collectively), occupy all the country eastward, and extend in a vast parallelogram from Lithuania in the north, to the Ukraine in the south.

The whole of Poland (Polan. Scla. a plain), may be characterised as one vast plain; the only great mountains near, being the Carpathians, which form the barrier between this country and Hungary. There is indeed an inferior range which penetrates the south-west of Poland from Silesia; and a curved line of higher country runs centrally from Hungary to Lithuania, marked by the course of the rivers. All those on the west side of this line flowing into the Baltic; and, along the east, into the Black Sea. Some parts of this almost immense level, bear the marks of cultivation, but others are vast tracts of forest or marsh in traversing which the traveller scarcely meets with any thing to cheer his way. Nothing is heard but the cracking of the driver's whip, re-echoed from the lonely depth of the forest, and no trace of human beings presents itself, except in the mark of some former traveller's fire. The forests are most abundant in the interior and eastern part of ancient Poland. The districts of the new kingdom present many vast plains waving with grain, or pastured by droves and herds. 'It is not easy to traverse the vast wildernesses of Poland,' says a modern writer, 'without being filled with a sentiment of awful admiration. Their frequent and deep shade conspires with their never-ending extent to suggest an idea of infinity which approaches the sublime; and sublime indeed would be the prospect, if only a solitary mount peered above the tops of the trees, that the eye might be permitted to rove unimpeded over a hemisphere of green and delightful foliage. During the summer heat, the forests afford a very grateful shelter to the traveller. In winter, the scene is totally changed. Every bough and branch is heavily laden with congealed snow, and the evergreens are completely hid beneath this white and universal covering. The pines lift their lofty heads in the cold, clear air, huge and still as giants, enchanted into pillars of salt.'

The rivers of Poland, which flow into the Baltic, are the Vistula, Niemer, Bug, Dwina, and Pregel; into the Euxine, the Przypiec, Dnieper, and Dniester. In the new kingdom, the Vistula is the most important stream; but it neither rises nor terminates in the country. It enters on the south-east, and, flowing through the central parts, passes Warsaw and Dantzic, and falls into the Baltic. It receives the Bug, and several other tributary streams, in its progress, and is connected with the Dnieper by the canal which joins it to the Prepiz, which flows into that river. By this means the Vistula affords an inland navigation of great utility in conveying the agricultural produce of Poland to the the ports of the Baltic, especially to Dantzic.

The state of cultivation, the woods, morasses, and other local causes, create a considerable degree of diversity in the climate. In all parts it is similar to that of Russia, under the same parallel; and, though it was long branded as generally unhealthy, in modern Poland the air in many places is dry and pure; and instances of longevity are numerous. During three or four months in the middle of winter, the temperature generally varies from 8° to 20° of Fahrenheit's scale; and for nearly an equal period, in summer, it ranges from 65° to 75°. The winter usually commences about the end of October, or the beginning of November, and lasts five or six months, during the greatest part of which the whole face of the country is robed in a mantle of the purest white, and Nature presents a universal blank. The air at this season is however very serene; but, when the wind blows from the north or north-east, it is extremely keen and piercing. The seasons return with regularity. Spring is, as in most countries, the most agreeable; and it derives additional charms from its immediate contrast with the stern aspect of winter. The air gradually loses its severity, the temperature of the atmosphere becomes mild and genial, and no sooner is the bosom of the earth disrobed of its wintry vesture than vegetation proceeds with great rapidity. The most pleasant and fertile part, perhaps, is the Ukraine.

Poland yields, among the minerals, iron, lead, copp[illegible] marble: gold and silver, in insig-

nificant quantities, have also been found. Among its products are likewise rock crystal, alum, saltpetre, coal, and potter's clay. But the most noted of all the minerals is the salt yielded by the mines at Wieliczka and Bochnia, which are among the most celebrated in Europe. The salt prepared for traffic is cut into large cubical blocks, and conveyed to the places of its consumption, in distant parts of the country, without any package. It is so pure that it only requires pounding to render it fit for use. The annual revenue of these mines, previously to the first partition of Poland, in 1772, was estimated at three millions and a half of Polish florins, or nearly £98,000. Dr. Neale visited the mine at Wieliczka a few years since, and says, 'When all the party had descended, torches were lighted, and we found ourselves at the entrance of a chapel, hollowed out of the salt-rock, containing altars, columns, and statues. Thence we decended by spacious galleries and winding passages from one chamber to another, to the depth of 900 feet, where we found our progress terminated by a large lake, formed by the accumulated waters of the springs issuing from the sides of the mine: these springs dissolve large quantities of salt in their passage, and when at rest deposit it in beautiful cubical crystallisations at the bottom of the lake, from which they are raked up by means of instruments with long iron prongs. The extent of these excavations is 6000 feet in their longest diameter, which is from north to south, and about 2000 from east to west; the greatest depth to which they have gone is 900 feet, but even below that level they have ascertained the existence of immense strata of salt, extending from east to west, to an unknown distance. The chambers, scooped out in various directions, resemble the aisles of a cathedral. We entered one that contained a large table; at which, on solemn occasions, such as the visits of the members of the imperial family, 300 persons have been accommodated. The workmen employed generally amount to about 450; and in one of the mines there is a stable for fifty horses. No women are ever permitted to enter them. The galleries and shafts are perfectly dry, and even dusty; for the salt, imbibing all moisture, like a sponge, robs even the human body in its passage, and makes the mouth and throat feel hot and dry. The intricacy of the numerous passages is such, that they sometimes mislead even the best accustomed to them. The mines of Bochnia employ 250 workmen; their extent from north to south is only 750 feet, and from east to west 10,000 feet. The richness of these mines is such, that it has been calculated that their contents might suffice for the whole population of Europe. Every year there are dug up 600,000 quintals; and, although they have now been constantly worked since the year 1261, there is no appearance of their contents being exhausted.'—Travels in Germany, Poland, &c.

The *soil* has been miserably neglected for ages, yet the annual export of corn is well known to be very great. It has been taken at 4,000,000 English quarters. The export of cattle is also considerable; it is said that, in some of the remote uncultivated parts, herds of wild cattle, and even horses, are to be found, as in South America. Mr. Jacob, in his intelligent Report to government on the Trade in foreign Corn, and on the Agriculture of the north of Europe, has the following important observations respecting this country:—

'The far greater part of that division of ancient Poland, which is now comprehended in the vice-regal kingdom of that name, is a level country, with scarcely an ascent or descent, except where the courses of the rivers have formed channels below the general level of the country. As these rivers, though in summer they appear small streams, are swollen by the rains of autumn, and the melting of the snow on the Carpathian Mountains in the spring, they form large channels, extending on both sides to a great distance and their deposit, in many parts, enriches the land, and it presents, in the summer, the aspect of verdant and luxuriant meadows. In other parts the periodical swellings of the streams have formed morasses, which in their present state are not applicable to any agricultural purposes. The plains, which extend from the borders of one river to another, are open fields, with scarcely any perceptible division of the land, and showing scarcely any trees even around the villages. The portion of woodland on these plains is very extensive; but they are in large masses, with great intervals of arable land between them. The soil is mostly sandy, with occasional mixture of a sandy loam; it is very thin, resting chiefly on a bed of granite, through which the heavy rains gradually percolate. Such a soil is easily ploughed; sometimes two horses or two oxen, and not unfrequently two cows, perform this and the other operations of husbandry. This representation of the kingdom of Poland is strictly applicable to six of the eight waiwoodships or provinces into which it is now divided.

'To the south of the river Pilica, which comprehends the two provinces of Sandomir and Cracow, the appearance of the land, and the face of the country, improve; and, in proceeding south to the banks of the Vistula, there is to be seen a more undulating district and a more tenacious and fruitful soil. Much of the land is a clayey loam, requiring three or four horses to plough it, yielding, when tolerably managed, crops of excellent wheat and oats; and, where the husbandry is so good as to have adopted the practice of sowing clover between the two corn crops, the produce is very abundant. The southern point of this district, forming now an independent republic, called, from the name of its capital, Cracow, is very fertile. It extends along the Vistula about twenty miles, and contains, in 500 square miles or 320,000 acres, about 100,000 inhabitants.

'Some of the estates in Poland, belonging to the nobility of the highest rank, are of enormous extent; but owing to the system of dividing the land among all the children, unless a special entail secures a majorat to the eldest son, which is in some few instances the case, much of it is possessed in allotments, which we should deem large; but which, on account of their low value, and when compared with those of a few others, are not so. Of these secondary classes of es-

tates, 5000 or 6000 acres would be deemed small, and 30,000 or 40,000 acres large. There are, besides these, numerous small properties, some of a few acres, which, by frequent subdivisions, have descended to younger branches of noble families. The present owners are commonly poor, but too proud to follow any profession but that of a soldier, and prefer to labor in the fields with their own hands rather than to engage in trade of any kind. As titles descended to every son, and are continued through all the successors, the nobility have naturally become very numerous; but, since the emperor of Russia has gained the dominion over Poland, the use of titles has been restricted. No one can assume that of baron, unless his clear income from his estates exceed 1000 gulden or £25; none that of count, whose rents are less than 3000 gulden or £75; and none that of prince, who has less than 5000 gulden or £125.

'The whole of the lands are made alienable, and may now be purchased by persons of any rank, and are actually held by some who are burghers or peasants; the Jews alone are prohibited from becoming proprietors of the soil, though they have very numerous mortgages upon it. When they foreclose, the lands must consequently be sold; and as these Jews, the monied capitalists, cannot become purchasers, the prices they yield are very trifling.

'The most numerous class of cultivators are peasants; they have a limited property in the lands which they occupy, and the cottages in which they live, under the condition of working a stipulated number of days in each week on their lord's demesne, and paying specified quantities of produce, such as poultry, eggs, yarn, and other things, in conformity with ancient usage. The extent of these holdings varies according to the quality of the land, and the quantity of duty work, or of payments in kind, which are to be fulfilled.

'On a large property which I examined the peasants had about forty-eight acres of land each, for which they were bound to work for two days in every week with two oxen. If their labor was farther required, they were paid three-pence per day for two other days, and if beyond that number sixpence per day. On another property I found the peasants had about thirty-six acres, for which they worked two days in each week, with two oxen; when called upon for extra labor, they are paid sixpence a day for themselves and oxen for the next two days, or, if they work without their oxen, threepence. If their labor is demanded the remaining two days in the week, the sum to be paid is made the subject of a special agrement; on one estate the peasants had but twenty-four acres, and did one day's work themselves, with one horse; the rest of their labor was paid for in money, by agreement made at the time it was required. Another proprietor, on land somewhat exhausted, granted to each of his peasants more than fifty acres of land, for which they worked with two horses, three days in a week. It would be easy to give instances of more various rates of duty work, and of the quantity of land which is appropriated for its performance. Some are of a luxurious and of a ludicrous kind. I was told that the inhabitants of two whole villages, near a princely domain, hold their lands on condition of employing a certain number of days in each week in cleaning the walks, and keeping in good order the pleasure grounds, which surround the vast castle of their benevolent and hospitable lord.'

In general our author found the peasantry in a condition of great distress, and involved in debt to their lord. They are no longer slaves, or adstricti glebæ. By the constitution promulgated in 1791 they were declared free, and that part of the constitution suffered no alteration under the dominion of the Russians and Prussians; was confirmed when the king of Saxony became sovereign; and was again assured in 1815, when the emperor of Russia was enthroned as king of Poland. The practical effects of the privileges thus granted have hitherto been very inconsiderable. The peasants can leave their land, but must first acquit the pecuniary demands of their lords. Few are able to do this, as most of them are in arrears. The lords must supply them with their oxen, in case one dies; their plough and other implements must be furnished to them by him; and in years of scarcity they become involved in debt, for the requisite subsistence of themselves and their cattle. This, together with local attachments, and the habit of respect for their feudal superior, has, in general, prevented the peasants from wandering away from the houses of their fathers, and from the protection of their chief. It thus rarely happens that the peasants quit the estates on which they have been born; and the instances that do occur are chiefly to be attributed to the embarrassed circumstances into which their lord may fall. A declining property produces a necessitous peasantry, and such may sometimes be induced to try their fortune under another proprietor.

The want of peasantry is a general subject of complaint, especially among those (who are the far greater number) whose estates are loaded with mortgages or other incumbrances; such sometimes lose them, but cannot command the means of inducing new ones to settle on the lands. Though no longer slaves, the condition of the peasants is but little practically improved by the change that has been made in their condition. When a transfer is made, either by testament or conveyance, the persons of the peasantry are not indeed expressly conveyed, but their services are, and in many instances are the most valuable part of the property.

'It is said that, when the freedom of the peasants was first decreed, it was viewed by them with great distrust. They were alarmed with the apprehension that in age or sickness, or other incapacity, they should be abandoned by their lords, and left to perish in want. By the form that society has taken in the course of the thirty-four years that have passed since the alteration was enacted, their alarms have been dispelled; and, the same acts of kindness being exercised in most cases as were formerly customary, they can perceive no alteration in their condition, that is, either materially more beneficial or injurious to them.

'These people live in wooden huts, covered

with thatch or shingles, consisting of one room with a stove, around which the inhabitants and their cattle crowd together, and where the most disgusting kinds of filthiness are to be seen. Their common food is, cabbage, potatoes sometimes, but not generally, pease, black bread, and soup, or rather gruel, without the addition of butter or meat. Their chief drink is water, or the cheap whiskey of the country, which is the only luxury of the peasants; and is drunk, whenever they can obtain it, in enormous quantities. They use much salt with their vegetable food, and, in spite of the heavy tax on that commodity, can never dispense with the want of it at their meals. I was informed, and saw reason to credit the accounts, that, when the peasants brought to the market towns their trifling quantities of produce, a part of the money was first used to purchase salt, and the rest spent in whiskey, in a state of intoxication that commonly endured till the exhaustion of the purse had restored them to sobriety. In their houses they have little that merits the name of furniture; and their clothing is coarse, ragged, and filthy, even to disgust. Very little attention has been paid to their education, and they are generally ignorant, superstitious, and fanatical. They observe about twenty holidays in the year, besides the Sundays; and pass much of their time in pilgrimages to some favorite shrine, in counting beads, and similar superstitious occupations.

'This representation of the condition and character of the peasantry,' says Mr. Jacob, 'though general, cannot be considered so universal as to admit of no exceptions; some rare instances of perseverance in economy, industry, and temperance, are to be found; and, unfavorable as their circumstances may be for the creation of such habits, they are here attended by the usual correspondent results. Some few peasants have been enabled to gain three or four allotments, and to employ their sons or hired servants to work for them; and there are instances of such persons making a still further progress, and being enabled to purchase estates for themselves. Such cases as these, however, occur so rarely, that, though they produce individual comfort and wealth, they have no perceptible influence on the general mass of society, or on the surplus quantity of agricultural productions.

'As may be naturally inferred, from the system under which labor is applied to the land, that labor is performed in the most negligent and slovenly manner possible. No manager of a large estate can have his eye constantly on every workman; and, when no advantage is gained by care in the work, it will naturally be very imperfectly executed. All the operations of husbandry struck me to be very ill performed: the ploughing is very shallow and irregular; the harrows with wooden tines do not penetrate sufficient to pull up weeds in fallowing; the roller is almost unknown; and thus the land is filled with weeds of all descriptions. I observed the same want of attention in threshing; and it appeared to me that a much greater proportion of the grain was left among the straw, than in that which has passed under an English flail. In short, the natural effects of the system of duty work was visible in the whole of the administration of the large estates where it is followed, with the exception of those few proprietors who have intelligent and active managers, and are free from pecuniary embarrassments. The common course of cropping is, the old system of a whole year's fallow, followed by winter corn, and that by summer corn, and then a fallow again. Thus one-third of the land bears nothing. The winter crop in the northern part of Poland consists of wheat and rye; the proportion of the latter to the former is nearly as nine to one, and the wheat enjoys the benefit of what little manure is preserved. Thus the wheat actually cultivated does not occupy more than one-thirtieth part of the arable land. In the southern part of the kingdom the wheat bears a larger proportion to the rye, amounting on the more tenacious soils to a fifth, and even in some cases to a fourth part of the rye. The statements I could collect, and my own observations, led me to conclude the stock of cattle to be very small, in proportion to the extent of land, and to the number of inhabitants.

The reformation was early introduced into Poland, and in 1550 a complete equality in privileges was established between the Catholics and Protestants. At the end of that century the Socinians appeared, who were at first permitted to live in tranquillity, but were afterwards driven to abjuration or exile. In the mean time the church of Rome had the art to procure an act, which confirmed to the Catholic clergy the permanent possession of their vast property, and the preponderance which naturally followed enabled that party to narrow the toleration. In 1766 a relaxation of the prohibitions was obtained by the interference of Russia, Prussia, England, and Denmark; and the partition that ensued altered the face of affairs so far that the Catholics found it necessary to sue for that toleration which they had refused to others. Before this change the usurpations of the clergy had gone beyond all bounds; the tithes in some parts were said to be more nearly a fifth than a tenth of the produce; and the pope was not only the head of the Catholics, but interfered in every appointment of the bishops and archbishops. His nuncio held a separate court for the decision of ecclesiastical cases.

The numbers of the Greek church are now on the increase in the Russian provinces: the Jews, as we have seen, occupy a conspicuous place in the population. They are the men of business for almost the whole country; the current money in the kingdom is chiefly in their hands; and a great proportion of the land is mortgaged to them. Some of them have a fair title to the name of merchants; but the majority are mean and fraudulent.

The Poles are, for the most part, almost as illiterate as their neighbours, the Russians: but universities were established in Poland a considerable time before the partition, viz. at Cracow, Wilna, and Posen; strange as it may seem, however, there were no schools till the different governments among whom the country was divided, erected a certain number. Additional universities have also been established at Lemberg

Warsaw. The Polish language is a dialect of the Sclavonic; though less unpleasant to the ear than might be imagined. The general use of Latin in literary composition, and even in the conversation of the higher ranks, has prevented the improvement of the vernacular tongue. But some works of merit are said to have been composed in it during the last century. The Poles seem to have a peculiar facility in learning foreign languages.

The Poles, originally descendants from the ancient Sclavonic stock, have, in their general appearance, as well as in their language, manners, and customs, a great similarity to their eastern neighbours. In general they are of a middle stature, but many of the superior classes are tall and graceful, though the peasants are often low and stunted. The countenance of the Poles is generally open and friendly. The men of all ranks wear large whiskers, and shave their heads, leaving only a single lock of hair on the crown. The females of the higher ranks are celebrated for their beauty, their elegant figures, and graceful demeanor. In society they are lively and animated. Mr. Coxe considers the dress of the higher classes, both men and women, as elegant. That of the gentlemen, he says, is a waistcoat with sleeves, with an upper robe of a different color, which reaches below the knee, and is fastened round the waist with a sash or girdle; the sleeves in warm weather are tied behind the shoulders. In summer the robe is of silk; in winter of cloth, velvet, or stuff, edged with fur, and a sabre is a necessary appendage of the dress, as a mark of nobility. The gentlemen wear caps or bonnets of fur, and buskins of yellow leather, the heels of which are plated with iron or steel. The dress of the ladies is a simple polonaise, or long robe edged with fur. This winter robe or pelisse is lined, or rather padded with wool, but is only used when they go into the open air. In other respects their dress differs little from that of the English or French ladies. Many of the young men in Poland have laid aside the national costume, and adopted the English dress. The summer dress of the peasants consists of a shirt and drawers of coarse linen, without shoes or stockings, and of round caps or hats. The women of the lower class wear upon their heads a wrapper of white linen, under which their hair is braided, and hangs down in two plaits.

The best buildings of the country are occupied by the Jews, whose filth would be intolerable any where else, but cleanliness is not regarded as a virtue in Poland. Men, women, children, hogs, cows, and poultry, all live under the same roof; and the traveller is frequently obliged to share this only apartment in the house with them. Every estate has its still; spirits are found every where, and being used with every meal, habits of intoxication prevail to an extraordinary degree. Beer is little used by the peasantry, and provisions are hardly to be found by the traveller, except in the thinly scattered towns. The inns of Poland are in general stables, built of planks; having a room at one end, without window or furniture, and often so infested with vermin that lodgers seek for refuge and repose among the horses. The German settlers present a striking contrast to the natives. They have a cheerful look of industry and opulence, and their houses are comparatively clean and comfortable.

History.—The sovereigns of Poland at first had the title of duces, dukes or generals, as their office had been only to lead the armies into the field. The first of these is universally allowed to have been Lechus or Lecht; who, according to some writers, migrated at the head of a numerous body of the descendants of the ancient Sclavi; and, to this day, Poland is called by the Tartars the kingdom of Lechus. Busching, however, gives a different account of the origin of the Poles. Sarmatia, he observes, was an extensive country, inhabited by a variety of nations of different names. He supposes the Poles to be the descendants of the ancient Lazi, a people who lived in Colchis near the Pontus Euxinus; whence the Poles are sometimes called Polazi. Crossing several rivers, they entered Posnania, and settled on the borders of the Warta, while their neighbours the Zechi settled on the Elb, in the 550th year of Christ.

The name Poland, or Polska, as it is called by the natives, comes from the Sclavonic word Pole, or Polo, which signifies a country adapted to hunting, because the whole country was formerly covered with vast forests. To Lechus succeeded Viscimer, generally supposed to have been his nephew. He was a warlike and successful prince, subduing many provinces of Denmark, and building the city of Wismar, so called from his name. After his death the nobility were on the point of electing a sovereign, when the people, harassed by the grievous burdens occasioned by the wars of Viscimer, unanimously demanded another form of government. The nobility flattered this humor of the people, but instituted such an administration of affairs as threw all the power into their own hands. Twelve palatines, or vaivodes, were chosen; and the Polish dominions divided into as many provinces. These palatines exercised a despotic authority within their several jurisdictions, and aggravated the misery of the people by perpetual wars among themselves; upon which the Poles, worn out with oppression, resolved to return to their old form of government. They cast their eyes upon Cracus, or Gracus, whose wealth and popularity had raised him to the highest honors among his countrymen, and who is said to have been descended of the Roman Gracchi. He signalised himself against the Franks, whom he overthrew in several desperate engagements, and afterwards built the city of Cracow. He did not enlarge his dominions, but made his subjects happy by many excellent regulations. At last, after a long and glorious reign, he expired, or, according to some, was assassinated by a nobleman who aspired to the crown. He left three children; Cracus II., Lechus, and a daughter named Vanda. Cracus succeeded to the dukedom, but was soon after murdered by Lechus. However, the crime he had committed so disturbed his conscience, that the secret could not be kept. When it was known that he had murdered his brother, he was

deposed with ignominy, and his sister Vanda declared duchess. Soon after she had been raised to the sovereignty, one Rithogar, a Teutonic prince, sent an ambassador demanding her in marriage, and threatening war if his proposals were refused, when our heroine marched in person against him at the head of a numerous army. The troops of Rithogar abandoned him without striking a blow; upon which he killed himself in despair; and Vanda, having become enamored of him, was so much concerned for his death that to complete the romance of the story she is said to have drowned herself in the Vistula. From this unfortunate lady the country of Vandalia takes its name. The family of Cracus having thus become extinct, the Poles restored the vaivodes notwithstanding all that they had formerly suffered from them. The consequences were as before: the vaivodes abused their power. At that time the Hungarians and Moravians had invaded Poland with a numerous army, and were opposed only by a handful of men. However, one Premislaus, a private soldier, contrived a stratagem by which the numerous forces of the enemy were overthrown; and for his valor was rewarded with the dukedom. We are ignorant of the other transactions of his reign; but all historians inform us that he died deeply regretted, and without issue.

On his death several candidates appeared for the sovereignty, and the Poles determined to prefer the victor in a horse race. Lechus, one of the competitors, being detected in endeavouring to take an undue advantage, another Lechus, a peasant, who made the discovery, was raised to the throne, and the former was put to death. This happened A. D. 774, and Lechus III. behaved with great wisdom and moderation. Though he possessed the qualities of a great warrior, and extended his dominions on the side of Moravia and Bohemia, yet his chief delight was to make his subjects happy by peace. In the decline of life he engaged in a war with Charlemagne, and is said to have fallen in battle with that monarch; though others say he died a natural death. Lechus III. was succeeded by his son Rechus IV. who inherited all his father's virtues. He suppressed an insurrection in the Polish provinces, by which he acquired great reputation; after which he led his army against the Greek and Italian legions who had overrun Pannonia, and completely defeated them. Nor was his valor more conspicuous in the battle than his clemency to the vanquished. His son Popiel I., who succeeeded him, bears also the character of a virtuous and pacific prince. He removed the seat of government from Cracow to Gnesna, and was succeeded by his nephew Popiel II. a minor, whose maturity was distinguished by cruelty. Prompted by an ambitious and barbarous queen, he invited his twenty uncles, natural sons of Lechus III. to an entertainment, and poisoned them all. Their bodies being left unburied were devoured by rats. Foreign enemies took advantage of these disorders; and the state seemed to be on the verge of dissolution, when Piastus was proclaimed duke in 830, from whom the natives of ducal or regal dignity were called Piastes. This excellent monarch died in 861, and was succeded by his son Ziemovitus, who was of a more warlike disposition than his father, and who first introduced a regular discipline among the Polish troops. He was victorious in all his battles with the Germans and Hungarians; and considerably enlarged his dominions. After his death nothing remarkable happened in Poland till the time of Mieczislaus I. who attained the ducal authority in 964. He was born blind, and continued so for seven years; after which he is said to have recovered his sight without using any medicine; a circumstance so extraordinary that it was accounted a miracle. In his reign the Christian religion was introduced into Poland; in consequence of his marriage with Deborwka, daughter to the duke of Bohemia, who had rejected his offer, unless he would be baptised. He founded the archbishoprics of Gnesna and Cracow, and many other sees; but allowed his dominions to be ravaged by the Russians. He was succeeded by his son Boleslaus I. the first king of Poland.

Boleslaus I., surnamed Chrobry, succeeded to the sovereignty in 999. He professed and cherished Christianity, and was a man of great valor and prudence. The emperor Otho III. invested him with the regal dignity; which was confirmed by the pope. Upon this he affected a great deal of state. It, however, excited the envy of the duke of Bohemia, who had solicited the same honor for himself, and had been refused. His jealousy was further excited by the connexion between Boleslaus and the emperor, the former having married Rixa the emperor's niece. Without any provocation, therefore, he entered Poland at the head of a numerous army, committing every where dreadful ravages. Boleslaus immediately marched against him, and the Bohemians retired with precipitation. Scarcity of provisions, and the inclemency of the season, prevented Boleslaus at that time from following him; but, as soon as these obstacles were removed, he entered Bohemia at the head of a formidable army; took Prague after a siege of two years; and, after overruning the whole country, made himself master of the fortress of Wissogrod, with the duke and his son Jaremir; put out the eyes of the former, and condemned the latter to perpetual imprisonment. From Bohemia Boleslaus marched towards Moravia; but no sooner did he arrive on the frontier than the whole province submitted without a blow. A civil war having taken place, on the death of Wolodimir, grand duke of Russia, between his two sons Jarislaus and Suantepolk, the latter fled to Boleslaus for assistance; who accordingly set out at the head of a numerous army, under pretence of doing justice to Suantepolk. He was met on the Bog by Sarislaus at the head of an army much superior in number to his own, but he soon gained a complete victory over him, and obliged him to fly to Kiovia. This city was now taken, with a vast treasure, and thus Boleslaus became master of the greatest part of Russia; whereupon he reinstated Suantepolk, and completely routed a second army brought against him by Jarislaus. In return for these favors, which Boleslaus had conferred on Suantepolk, he projected nothing less than the

destruction of him and his whole army. The massacre was already begun when Boleslaus received the intelligence; and, having already assembled part of his army, fell upon the traitors with such fury that they were obliged to fly, and he got safe to Poland. But in the mean time Jarislaus, having assembled fresh forces, pursued the Poles; and having come up with them just as one-half had crossed the river Boristhenes attacked them with the utmost fury. Boleslaus defended himself with resolution; the Russians were entirely put to the rout, and a terrible carnage ensued. The vistory, however, though complete, was not decisive; for which reason Boleslaus continued his retreat, without attempting to conquer a country too extensive for him to keep in subjection. He next led his army into Saxony, plundered the country, and fixed the boundaries of his empire at the Elbe; where he erected two iron columns. He afterwards conquered Prussia and Pomerania; and then applied himself wholly to the enacting of wholesome laws. But in the midst of this tranquillity Jarislaus assembled the most numerous army that had ever been heard of in Russia, with which he appeared on the frontier of Poland. Boleslaus, though now advanced in years, marched out against his adversaries, and met them on the banks of the Boristhenes, where he gained another signal victory. Many thousand prisoners were taken, whom Boleslaus released upon very easy conditions. This well timed clemency produced such a happy effect, that the Russians voluntarily submitted to his jurisdiction, and again became his subjects. He died in 1025, after having vastly extended his dominions. Boleslaus was succeeded by his son Mieczislaus II., but he possessed none of the great qualities of his father, being indolent and debauched. In the beginning of his reign the Russians, Bohemians, and Moravians, revolted. However. as the spirit and discipline introduced by Boleslaus still remained in the army, Mieczislaus found no difficulty in reducing them again to obedience: after which, devoting himself entirely to voluptuousness, he was seized with a frenzy, which put an end to his life in 1034. The bad conduct of this prince proved very detrimental to the interest of his son Casimir. Instead of electing him king, the people chose Rixa his mother queen regent. She proved tyrannical, and so partial to her countrymen, the Germans, that a rebellion ensued, and she was forced to fly to Germany, whither she had sent Boleslaus's vast treasure. In consequence of her bad behaviour and expulsion, Casimir was driven out of the kingdom; and, a civil war taking place, many pretenders to the crown appeared. To the miseries occasioned by this were added those of foreign war both with the Bohemians and Russians. In the midst of these accumulated distresses, Casimir was loudly called for, and his election to the throne resolved on. After some search, he was discovered in France, where he had assumed the monastic habit. A dispensation being obtained, his return was celebrated with joy by all ranks; and he was crowned at Gnesna, by the primate, with great solemnity. He proved a virtuous and pacific prince; suppressed the banditti, restored order, and by his marriage with the princess Mary, sister to the duke of Russia, all differences with that nation were terminated. The kingdom flourished during his reign, and became more respectable from the wisdom and stability of the administration than it could have been by many victories. After a happy reign of sixteen years, he died much beloved and regretted.

By the administration of Casimir, the kingdom required sufficient strength to carry on several successive wars. Boleslaus II., the son of Casimir, an enterprising and valiant prince, succeeded to the throne; and three unfortunate princes, expelled from their own dominions, took refuge at his court. These were, Jacomir, son of Briteslaus, duke of Bohemia; Bela, brother to the king of Hungary; and Zaslaus, duke of Kiovia, eldest son to Jarislaus duke of Russia. The duke of Bohemia, dreading the consequences of Jacomir's escape, assembled an army, and, without any declaration of war, marched through the Hercynian forest, desolating Silesia, and laid waste the frontiers of Poland. Boleslaus marched against him with a greatly inferior force; but by his superior abilities surrounded his adversary in a wood, and reduced him to the greatest distress. In this extremity the duke sent proposals for accommodation, which were rejected with disdain by Boleslaus; upon which the former ordering fires to be kindled in his camp, as if he designed to continue there, escaped in the night. The king pursued him, but in vain; so he returned, after ravaging the frontiers of Moravia. The next year he entered Bohemia with a numerous army; but the duke submitted to such terms as he thought proper to impose. In these Jacomir was not forgotten, after which he determined to march towards Hungary, to assist Bela. Entering that country, at the head of a numerous body, he seized the king, who soon after died of a broken heart; so that Bela succeeded to the throne without farther opposition. After these victories, however, Boleslaus, instead of assisting Zaslaus, began to think of subjecting the whole of his dominion to himself, in right of his queen, as well as of his descent from Jarislaus's sister. Having therefore assembled a very numerous and well disciplined force, he entered the duchy of Kiovia, where he was opposed by Wisseslaus, who had usurped the sovereignty. Boleslaus, however, continued to advance; and the Russian prince, being intimidated by the number and good order of his enemies, deserted his own troops, and fled away privately; upon which his forces dispersed. The inhabitants of Kiovia now called to their assistance Suantoslaus and Uszevold, two brothers of Wisseslaus; but these princes, acting the part of mediators, procured pardon for the inhabitants from Zaslaus their natural sovereign. With the same facility the two princes recovered all the other dominions belonging to Zaslaus, only one city venturing to stand a siege, which was soon reduced. But in the mean time, the king of Hungary dying, a revolt ensued, and the two sons of Bela were on the point of being

deprived of their dominions. This Boleslaus no sooner heard than he marched into Hungary; where, by the bare terror of his name, he re-established tranquillity. While this was accomplishing, Zaslaus was again driven from his territories, all the conquests formerly made were lost, and Suantoslaus and Uszevold rendered more powerful than ever. The king, however, soon disconcerted their measures. He ravaged the palatines of Lusac and Chelm, reduced the strong city of Wolyn, and transported the booty to Poland. The campaign was finished by a battle with Uszevold, which proved so bloody that, though Boleslaus was victorious, his army was much weakened, and he could not pursue his conquests. In winter he made numerous levies; and returning in spring to Kiova reduced it, after several desperate attacks, by famine: but, instead of treating the inhabitants with cruelty, he commended their valor, and strictly prohibited his troops from pillaging or insulting them; distributing provisions among them with the utmost liberality. But this clemency was followed by a great disaster. Kiovia was the most dissolute, as well as the richest city in the north, and the king and all his soldiers gave themselves up to the dissipations of the place. The Polish women, exasperated at their husbands having been seven years absent, are said to have proved almost universally unfaithful. The effect was a general desertion, and Boleslaus saw himself left almost alone in the heart of Russia. A civil war now ensued; and when Boleslaus arrived with the few remaining Poles, and assisted by an army of Russians, he with difficulty restored the public peace. To add to the calamities of this unhappy kingdom, the schisms which for some time had prevailed in the church of Rome found their way into Poland. The matter came at last to be a contention for wealth and power between the king and clergy. This soon gave occasion to bloodshed; and the bishop of Cracow was massacred in his cathedral while performing the sacerdotal duties. This and other outrages in a short time brought on the signal vengeance of the clergy. Pope Gregory VII. thundered out the most dreadful anathemas against the king, released his subjects from their allegiance, deprived him of the titles of sovereignty, and laid the kingdom under a general interdict. To this terrible sentence Boleslaus in vain opposed his authority, and tried to recal the spirit which had formerly rendered him so formidable. Conspiracies were formed against him, and the whole kingdom became a scene of confusion. He fled therefore with his son Mieczislaus into Hungary: but here also the vengeance of the clergy pursued him, nor did they cease persecuting him till he was brought to a miserable end. Some writers state that he was murdered by the clergy as he was hunting; others that he killed himself in despair; and one author tells us that he wandered about in the woods of Hungary, and was at last killed and devoured by dogs. The destruction of Boleslaus was not sufficient to allay the papal resentment. It extended to the whole kingdom of Poland. Mieczislaus, the son of Boleslaus, was not suffered to ascend the throne; and the kingdom continued under the interdict which could be removed only by the force of gold. Besides the tax called Peter pence, new impositions were added of the most oppressive nature; till at length the pontiff, having satiated his avarice and impoverished the country, consented that Uladislaus, the brother of the deceased monarch, should be raised to the sovereignty with the title of duke. This prince being of a meek disposition, with little ambition, acquiesced in the will of the pope, accepted the terms offered, and sent an embassy to Rome. The interdict was now removed, but all his endeavours to recover the regal dignity proved fruitless; the pope having, in conjunction with the emperor of Germany, conferred that honor on the duke of Bohemia. Russia took the opportunity of the late civil disturbances to throw off the yoke; and this revolt drew after it the revolt of Prussia, Pomerania, and other provinces. The smaller provinces, however, were soon reduced; but the duke had no sooner returned to Poland than they again rebelled, and hid their families in impenetrable forests. Uladislaus marched against them with a considerable army; but was entirely defeated, and obliged to return back with disgrace. Next year, however, he had better fortune; and, having led against them a more numerous army, they submitted, and delivered up the ring-leaders of the revolt. No sooner were the Pomeranians reduced than civil dissensions took place. Sbigneus, the son of Uladislaus by a concubine, was placed at the head of an army by the discontented nobility, to subvert his father's government, and dispute the title of Boleslaus to the succession. The war was terminated by the defeat and captivity of Sbigneus; who was at first confined, but afterwards released, on condition that he should join his father in punishing the palatine of Cracow.

Before this could be done the palatine effected a reconciliation with the duke; with which the young princes being displeased, a war took place between them and their father. At last the palatine of Cracow was banished and the princes submitted; after which Uladislaus, having chastised the Prussians and Pomeranians, who had again revolted, died in 1103, the fifty-ninth year of his age. Uladislaus was succeeded by his son Boleslaus III., who divided the dominions equally betwixt his brother Sbigneus and himself. The former, being dissatisfied with his share, raised several cabals, and a civil war was for some time only prevented by the good offices of the primate; but at last Sbigneus, having stirred up the Bohemians, Saxons, and Moravians, against his brother, made such formidable preparations as threatened the conquest of all Poland. Boleslaus, being unprovided with forces to oppose such a formidable power, had recourse to the Russians and Hungarians; who readily embraced his cause. The event was, that Sbigneus was entirely defeated, and might easily have been obliged to surrender himself at discretion, had not Boleslaus left him in quiet possession of the duchy of Mazovia, to maintain himself suitably to his dignity. This kindness the ungrateful Sbigneus

repaid by entering into another conspiracy; until, the plot being discovered, he was seized, banished, and declared a traitor if ever he set foot again in Poland. The Pomeranians, however, armed in his behalf; but he was defeated, taken prisoner, and again banished. Almost all the nobility now solicited the king to put such an ungrateful traitor to death: this generous prince, however, notwithstanding all he had yet done, took him back to Poland, and appointed him a maintenance suitable to his rank. Boleslaus was scarcely freed from the intrigues of his brother, when he found himself in greater danger than ever from the ambition of the emperor Henry IV. He had attacked the king of Hungary, with whom Boleslaus was in close alliance, and from whom he had received assistance when in great distress himself. The king of Poland determined to assist his friend, and therefore made a powerful diversion in Bohemia, where he repeatedly defeated the Imperialists; upon which the latter were ordered to ravage Silesia, and even entered Poland, where they laid siege to Lubusz; but were at last obliged to abandon the enterprize. However they were not discouraged, but penetrated siill farther into Poland, and were laying waste all before them, when the superior skill of Boleslaus compelled them to retire without coming to action. This soon brought on a peace, which was confirmed by a marriage between Boleslaus and the emperor's sister. In short, Boleslaus III. might have equalled his ancestor, Boleslaus I., in glory, had he not been imposed upon by a Hungarian, whom in 1135 he made governor of Wislica, a strong town on the Nida, which he betrayed to the Russians. Boleslaus, enraged, made war upon the Russians, by whom he was entirely defeated, and by this disgrace was so much afflicted that he died soon after, having reigned thirty-six years.

Boleslaus, by his will, left his dominions equally divided among his four sons. Uladislaus, the eldest, had the provinces of Cracow, Sirad, Lencici, Silesia, and Pomerania. Boleslaus, the second son, the palatinates of Culm and Cujava, with the duchy of Mazovia. The palatinates of Kaleszh and Posnania fell to Mieczislaus, the third son; and to Henry, the fourth, were assigned those of Lublin and Sandomir. Casimir, the youngest child, then an infant in the cradle, seems to have been forgotten. By the will of the late duke, all the brothers were obliged to own the supremacy of Uladislaus, who was declared duke of all Poland. The harmony of the princes was first disturbed by the ambition of Christina, the wife of Uladislaus, who assembled the states, and made a long speech, showing the dangers which might arise from a partition of the ducal dominions among so many. Having thus induced the nobility to declare on his side, she first drove Boleslaus out of his territories; next marching against Henry, she dispossessed him also, forcing both to take refuge with Mieczislaus in Posnania, where all the three brothers were besieged. Several of the nobility interposed, and used all their influence to effect a reconciliation, but in vain. Uladislaus insisted that the besieged princes should surrender at discretion. Thus driven to despair, the brothers sallied out, and attacked the duke's army with such impetuosity that they obtained a complete victory, and took all his baggage. The brothers improved their victory, and laid siege to Cracow. The Russians, who had assisted Uladislaus at first, now entirely abandoned him, and evacuated Poland, which obliged him to shut himself up in Cracow; but, finding the inhabitants little disposed to stand a siege, he retired into Germany to solicit assistance from his wife's friends. This they refused, while in the mean time Cracow surrendered; the unfortunate Uladislaus was formally deposed, and his brother Boleslaus raised to the supreme authority.

Boleslaus IV. began his administration with an act of generosity to Uladislaus, to whom he gave the duchy of Silesia, which thus was separated from Poland, and has never since been re-annexed to it. This had no other effect upon Uladislaus than putting him into a condition to raise fresh disturbances; for he now persuaded the emperor Conrade to invade Poland; but Boleslaus so harassed and fatigued his army that he was obliged in a short time to return to his own country; and for some years Poland enjoyed profound tranquillity. During this interval Henry entered on a crusade, by which he procured extraordinary fame, but lost all his army. Soon after his return Poland was invaded by the emperor Frederic Barbarossa. The number of the Imperialists was so great that Boleslaus and his brothers did not think proper to oppose them in the field; but contented themselves with cutting off the convoys, placing ambuscades, and harassing them on their march. With this view the three brothers divided their forces, and desolated the country before the enemy. Thus the emperor on advancing could not subsist, and was at last reduced to such a situation that he could neither go forward nor retreat. Boleslaus on this was invited to the German camp, and a treaty was soon agreed upon, which was confirmed by a marriage between Adelaide, niece to the emperor, and Mieczislaus duke of Posnania. Boleslaus, having thus escaped from all danger, determined to attempt the conquest of Prussia. Having unexpectedly invaded the country with a numerous army, he succeeded in his enterprise; great numbers of infidels were converted, and many churches set up: but no sooner was Boleslaus gone than the inhabitants returned to their paganism. Upon this Boleslaus again came against them with a formidable power; but, being betrayed by some of the natives whom he had raised to posts of honor, his army was led into defiles, and almost entirely cut off; Boleslaus and Mieczislaus escaped with great difficulty. This misfortune was followed by another. The children of Uladislaus laid claim to all the Polish dominions which had been possessed by their father, and were supported by a great number of discontented Poles, and German auxiliaries. Boleslaus, unable to withstand his enemies by force, had recourse to negociation. An assembly of the states was held, before which the duke so fully refuted the claims of the children of Uladislaus,

that it was almost unanimously voted that they had kindled an unjust war; and, to take away every pretence for renewing the civil discords of Poland, they were a second time invested with the duchy of Silesia. After this, Boleslaus applied himself to the duties of his government at home till his death, which happened in 1174.

The states now raised his brother Mieczislaus to the ducal throne; but the moment he ceased to be a subject, he became a tyrant, and a slave to almost every vice; in consequence of which he was deposed, and his brother Casimir elected. Casimir was a prince of the greatest justice and benevolence; he redressed grievances, suppressed exorbitant imposts, and assembled a general diet, in which it was proposed to rescue the peasants from the tyranny of the nobility. This proved less difficult than had been imagined: the nobility were influenced by the example of the sovereign, they immediately granted all that he required; and, to secure this declaration in favor of the peasants, the archbishop of Gnesna issued anathemas against those who should endeavour to regain the privileges which they had now renounced; and the acts of the diet were transmitted to Rome, where they were confirmed by the pope. Finally, in an assembly of the diet, Casimir proposed to resign the sovereignty in favor of his brother. To this the states replied in the most peremptory manner: they desired him never more to mention the subject, lest they should be under the necessity both of deposing him and excluding his brother, who, they were determined, should never more have the dominion of Poland. Casimir, however, was so much concerned at the account of his brother's misfortunes, that he tried every method to relieve him, and even connived at the arts practised by some discontented noblemen to restore him. By a singular generosity, he facilitated the reduction of Gnesna and Lower Poland, where Mieczislaus might have lived in peace and splendor, had not his heart been incapable of feeling kindness. The consequence was, that he used all his art to wrest from his brother the whole of Poland, and actually conquered the provinces of Mazovia and Cujava; but of these he was soon dispossessed. After this he made another attempt, on occasion of a report that Casimir had been poisoned in an expedition into Russia. He surprised the city of Cracow; but the city refused to surrender, and his hopes were entirely blasted by the return of Casimir himself; who, with unparalleled magnanimity intreated peace of him. The last action of this amiable prince was the conquest of Russia, which he effected rather by the reputation of his wisdom and generosity than by arms. Those barbarians voluntarily submitted to a prince so famed for his benevolence and humanity. Soon after his return he died at Cracow, lamented as the best prince in every respect who had hitherto filled the throne.

Casimir left one son, named Lechus, an infant; and the states, dreading the consequences of a minority, hesitated at appointing him sovereign. At last, however, Lechus was nominated, chiefly through the interest he had obtained by the reputation of his father's virtues. The consequence was what might have been expected. Mieczislaus formed an alliance against him with the dukes of Opelen, Pomerania, and Breslau; and, having raised all the men in Lower Poland that could bear arms, took the road to Cracow with a numerous army. A bloody battle was fought on the banks of the Mozgarva; in which both sides were so much weakened that they were forced to retire. Mieczislaus was first ready for action, and therefore had the advantage; however, he thought proper to employ artifice rather than force; having, therefore, attempted in vain to corrupt the guardians of Lechus, he entered into a treaty with the duchess dowager his mother. To her he represented the miseries which would ensue from her refusal of the conditions he proposed. He stipulated to adopt Lechus and Conrade, her sons, for his own; to surrender the province of Cujava for their support; and to declare them heirs to all his dominions. The principal nobility opposed this accommodation, but it was accepted by the duchess; and Mieczislaus was once more put in possession of the capital, after having taken a solemn oath to execute the treaty. But it was a maxim with him that a sovereign is no longer obliged to keep his oath than while he dare not break it. Having obtained power, he soon acted as if no treaty with the duchess had subsisted. On this, the duchess, perceiving herself duped, formed a strong party; Mieczislaus was driven out of Cracow, and almost reduced to his former circumstances, when he produced a variance between the duchess and the palatine of Cracow, and once more regained possession of that district, but did not long enjoy his prosperity, falling a victim to his intemperance; so that Lechus was restored in 1206. The government of Lechus II. was altogether most unfortunate. In his time the Tartars made an irruption, and committed every where the most cruel ravages; they came at last to an engagement with the Poles, assisted by the Russians; and, after an obstinate and dreadful conflict, obtained a complete victory. This incursion, however, terminated precipitately; for they retired just as the whole kingdom was ready to submit; but the devastations they had committed produced a famine, which was soon followed by a pestilence that depopulated the whole country. In this unhappy situation of affairs, Lechus was murdered by his subjects as he was bathing. A civil war took place after his death; and the history for some time is so confused that it is difficult to say who was his successor. During this anarchy the Tartars made a second irruption, and were advancing to the capital when they were attacked and defeated with great slaughter by the palatine of Cracow. The power of the enemy, however, was not broken; next year they returned, and committed incredible barbarities. They were returning, laden with spoil, when the palatine again fell upon them, but after an obstinate engagement he was defeated; the nobility now fled into Hungary, and the peasants sought an asylum among rocks and forests. Cracow, being left defenceless, was taken, pillaged, and burnt; after which the Tartars desolated Silesia and Moravia, destroying Breslau and other cities. Nor did Hungary escape their barbarity; the king

gave battle to the Tartars, but was defeated with vast slaughter, his capital laid in ashes, and above 100,000 of his subjects massacred. Nothing could withstand the prodigious numbers of this new enemy, and the fury with which they fought. On the frontiers of Hungary they fixed their head-quarters; and spread their devastations on every side with a celerity and success that threatened the destruction of every neighbouring kingdom.

In this dreadful situation was Poland when Boleslaus V., surnamed the Chaste, was raised to the sovereignty. He was opposed by his uncle Conrade the brother of Lechus, who was provoked at becoming the subject of his own nephew. Having assembled a powerful army, Conrade gained possession of Cracow; assumed the title of duke of Poland; and might possibly have kept possession of the throne, had not his avarice and pride equally offended the nobility and peasants, who unanimously invited Boleslaus from Hungary, to come and head the insurrection which now took place. On his arrival he was joyfully received into the capital; but Conrade headed a powerful party; and on this occasion the knights of the Teutonic order were first by him called into Poland. Conrade, however, was defeated in two pitched battles, and forced to live in a private situation; though he never ceased to harass his nephew. Of the reign of Boleslaus we have little account, except that he made a vow of perpetual continency, and imposed the same on his wife; that he founded near forty monasteries; and died after a long reign in 1279; having adopted Lechus duke of Cujavia, and procured a confirmation of his choice by the people. The reign of Lechus III. was one continued scene of foreign and domestic trouble. On his accession he was attacked by the united forces of Russia and Lithuania, assisted by the Tartars; whom, however, he defeated in a pitched battle, and obliged to quit the kingdom; but civil dissensions took place soon after, and increased to such a degree that Lechus was obliged to fly to Hungary. The inhabitants of Cracow alone remained firm in their duty; and they were at last relieved by Lechus at the head of an Hungarian army, who defeated the rebels, and restored to his kingdom a legitimate government. He had scarcely reascended the throne when the united forces of the Russians, Tartars, and Lithuanians, made a second irruption into Poland, and desolated the country. Their forces were rendered more terrible by their having along with them a vast number of large dogs trained to war. Lechus, however, with an army much inferior, obtained a complete victory. Soon after this he died, with the reputation of a warlike and wise, but unfortunate prince.

A civil war once more ensued; and the affairs of the state continued in a declining condition, till 1296, when Premislaus, then duke, resumed the title of king. In 1305 Uladislaus Locticus, who had seized the throne in 1300, and afterwards been driven out, was again restored. The first transaction of his reign was a war with the Teutonic knights, who had usurped the greater part of Pomerania. They had been settled in the territory of Culm by Conrade duke of Mazovia; but soon extended their dominion over the neighbouring provinces, and, having obtained possession of Dantzic, massacred a number of Pomeranian gentlemen in cold blood. The knights were ordered by the pope to renounce their conquests; but they set at nought his thunders. The king first marched against the marquis of Brandenburgh, because he had pretended to sell the right of those countries to the Teutonic knights. Uladislaus next laid waste the territory of Culm; and, though opposed by the forces of the marquis, the knights, and the duke of Mazovia, obtained the victory in two decisive battles. Had he improved these advantages he might easily have exterminated the whole order, but he concluded a treaty under the mediation of the kings of Hungary and Bohemia. In a few months he was convinced of the perfidy of the knights; for they not only refused to evacuate Pomerania as had been stipulated, but endeavoured to extend their usurpations. Uladislaus, enraged at this, took the field a third time, and gave them battle with such success that 4000 knights were left dead on the spot, and 30,000 auxiliaries killed or taken prisoners. After this he spent the remainder of his life in tranquillity.

He was succeeded by his son Casimir III., surnamed the Great, who subdued the province of Russia Nigra in a single campaign. Next he turned his arms against Mazovia; over-ran the duchy, and annexed it as a province to the Polish crown; after which he applied himself to domestic affairs. The only vice with which he is charged is incontinency; but even this the clergy declared to be a venial sin, amply compensated by his other virtues. Casimir was succeeded by his nephew Lewis king of Hungary; who, perceiving a coldness in the Poles towards him, left Poland soon after his coronation, committing the government to the hands of his mother Elizabeth. Poland at this time, however, was too much distracted to be governed by a woman. The country was over-run with robbers, who committed the most horrid disorders; it was likewise invaded by the Lithuanians; the whole province of Russia Nigra revolted; and the kingdom was filled universally with dissension. The Poles could not bear to see their towns filled with Hungarian garrisons; and sent a message to the king, reproaching him with his neglect of them. On this Lewis raised a numerous army to subdue their spirit. His first operations were directed against the Russians; whom he reduced to subjection. Then he turned his arms against the Lithuanians, and, driving them out of the kingdom, re-established tranquillity. On his death Hedwiga, daughter of Casimir, was proclaimed queen; she married Jagello, great duke of Lithuania, who was now converted to Christianity, and baptised by the name of Uladislaus. In consequence the duchy of Lithuania, as well as the vast provinces of Samogitia and Russia Nigra, became annexed to the crown of Poland. This excited the jealousy of the Teutonic knights, who were sensible that Uladislaus would now undertake the reduction of Pomerania. On a sudden, therefore, two armies marched towards the fron-

tiers of the duchy, which they penetrated, laying waste the country. As soon as he heard of these ravages, Uladislaus raised an army, the command of which he committed to his brother Skirgello, who defeated the knights, and obliged them to abandon their conquests. In the mean time Uladislaus marched into the Higher Poland, which was under many petty tyrants; the palatine of Posnia in particular had distinguished himself by his rebellious practices; but he was completely defeated by Uladislaus, and the whole country reduced to obedience.

Having secured the tranquillity of Poland, Uladislaus visited Lithuania, with a great number of the clergy, to convert his pagan subjects. This he effected, but left the care of the duchy to his brother Skirgello, a man of a cruel, haughty disposition, associating with him his cousin Vitowda, a prince of a very contrary character. The barbarity of Skirgello soon obliged this prince to take refuge among the Teutonic knights, whom he at length joined in invading the country. As soon, however, as an opportunity offered, he came to an accommodation with the king, who bestowed on him the entire government. He endeavoured to repair the calamities which the late wars had occasioned; but his impetuous valor prompted him at last to engage in a war with Tamerlane the Great, and he encountered an army of 400,000 Tartars under Ediga, Tamerlane's lieutenant, with only a tenth part of their number. The battle continued for a whole day; but at last Vitowda, being surrounded by the enemy, broke his way through with prodigious slaughter, and came off without a defeat. During the absence of Vitowda, the Teutonic knights had penetrated into Lithuania; on his return he attacked and defeated them, making an irruption into Livonia. This was succeeded by a long series of wars between Poland and Prussia, in which Uladislaus himself took the field. He penetrated into Prussia, took several towns, and was advancing to Marienburg, when he was met by the Prussian knights, who determined to hazard a battle. When the engagement began the Poles were deserted by their auxiliaries, but the courage and conduct of the king so animated them, that, after a desperate battle, they obtained a complete victory; near 40,000 of the enemy being killed in the field, and 30,000 taken prisoners. Uladislaus concluded a peace upon easier terms than his adversaries had any reason to expect. But some infraction of the treaty soon occasioned a renewal of hostilities, and Uladislaus would now hearken to no terms; until the enemy, driven to desperation, determined on burying themselves in the ruins of their capital. The siege was accordingly commenced, and both sides behaved with great vigor; but at last, through the good conduct and valor of the grand master Plawen, the Polish monarch was obliged to grant them an advantageous peace. Uladislaus V. died in 1435, and was succeeded by his son Uladislaus VI., then only nine years of age.

He had scarcely ascended the throne when the kingdom was invaded by the Tartars, who defeated Buccarius the Polish general; and, committing every where dreadful ravages, returned to their own country loaded with booty. A few years after the nation was involved in a war with Amurath II., emperor of the Turks. But, before the young king could take the field, a strong body of auxiliaries was despatched under the celebrated John Hunniades, vaivode of Transylvania, to oppose the Turks, and defeated Amurath with the loss of 30,000 men; after which Hunniades retook all the places which had been conquered by Amurath. A treaty was concluded, by which the Turks promised to relinquish their designs upon Hungary, to acknowledge the king's right to that crown, and to give up all their conquests in Rascia and Servia. This treaty was sealed by mutual oaths; but Uladislaus broke it at the persuasion of the pope's legate; who insisted that now was the time for humbling the power of the infidels. The consequence of this perfidy was, that Uladislaus was entirely defeated and killed at Varna, and the greatest part of his army cut in pieces.

Uladislaus VI. was succeeded by Casimir IV., in whose reign the Teutonic knights were subdued, and obliged to yield up the territories of Culm, Michelaw, and Pomerania, with the towns of Elbing, Marienburg, Talkmith, Schut, and Christburg. On the other hand, the king restored to them all his other conquests in Prussia, granted a seat in the Polish senate to the grand-master, and endowed him with other privileges, on condition that, six months after his accession, he should do homage for Prussia, and take an oath of fidelity to the king and republic. The diet did not think proper to renew the war against the Turks, but took under their protection the hospodar of Moldavia; as thinking that this province would make a convenient barrier to the Polish dominions. About this time also, the crown of Bohemia becoming vacant, the people wished to be governed by a prince of Poland; upon which the barons elected Uladislaus, eldest son of Casimir, in opposition to the intrigues of the king of Hungary. Not satisfied with this, Uladislaus took advantage of the dissensions in Hungary, to unite that crown to his own; and this he also effected. So many foreign expeditions, however, exhausted the treasury; the gentry were greatly diminished by a number of bloody engagements; agriculture was neglected, and the country almost depopulated. Before a proper remedy could be applied for these evils Casimir died, in 1492, more admired than beloved or regretted. It is related by the historians that in his reign the deputies of the provinces first appeared at the diet, and assumed to themselves the legislative power; all laws before this time having been framed by the king in conjunction with the senate. Before Casimir's time, also, the Latin language was understood only by the clergy of Poland.

During the succeeding reigns of John, Albert, and Alexander, the Polish affairs fell into decline, the kingdom being harassed by continual wars with the Turks and Tartars. However, they were retrieved by Sigismund I., who ascended the throne in 1507. This monarch, having reformed some abuses, next set about rendering the kingdom as formidable as it had formerly been. He first quelled a rebellion which broke out at Lithuania; after which he

drove the Walachians and Moldavians out of Russia Nigra, and defeated the Russians with the loss of 30,000 men. The Russian general, and several noblemen of the first distinction, were taken prisoners. After this the king turned his arms against the Teutonic knights, who had elected the marquis of Brandenburgh their grand-master. He took several important places in Brandenburgh; but, as he was pursuing his conquests, the marquis was reinforced by 14,000 Germans, under the duke of Schonenburg, who laid siege to Dantzic. They were obliged, however, to relinquish their enterprise; and, in their retreat, were attacked and cut to pieces by a strong detachment of Polish cavalry. Soon after this the marquis submitted to the conqueror. Sigismund granted him half the province of Prussia as a secular duke, dependent on the crown of Poland. The power of Sigismund now excited the jealousy of Austria; and the vaivode of Walachia, with 50,000 men, made an irruption into Pokatior, but was defeated by count Taro at the head of only 6000. The count, having then augmented his army with a strong body of Lithuanians, attacked the Muscovites and Tartars (also excited by the emperor against Poland), pursued them into Russia, reduced several towns, and at last laid siege to the fortress of Straradub; by which means the regent and nobility were obliged to surrender at discretion: Taro carried off upwards of 60,000 prisoners, with an immense booty. In the reign of Sigismund the kingdom of Poland appears to have been at its highest pitch of glory. This monarch possessed the republic of Poland, the great duchies of Lithuania, Smolensko, and Saveria, besides considerable territories beyond the Euxine and Baltic; while his nephew Louis governed Bohemia, Hungary, and Silesia. But this glory received a sudden check in 1548 by the defeat and death of Lewis, who perished in a battle with Solyman, emperor of the Turks. The daughter of this prince married Ferdinand of Austria; whereby Hungary, Bohemia, and Silesia, became inseparably connected with the hereditary dominions of the Austrian family. Sigismund died a few months after, aged eighty-four, leaving behind him the character of the completest general, and the ablest politician, of the north; he was also, personally, a very strong man.

Sigismund Augustus, who succeeded his father Sigismund I., proved also a great and fortunate prince. He applied himself to the reforming of abuses, enriching the treasury, and redeeming the crown lands. Out of the revenue, thus recovered, he obtained a formidable standing army, without laying any additional tax upon his subjects. The province of Livonia was then divided between the Teutonic knights and the archbishop of Riga; when the Russians, under pretence of assisting the former, seized great part of the dominions of the latter. The archbishop had recourse to Sigismund; who, after fruitless efforts to accommodate matters, marched to the frontiers of Livonia with an army of 100,000 men The knights, now deserting their late allies, put themselves under the protection of the king of Poland: but the czar, John Basilides, did not lose his courage; he even refused any answer to the proposals of peace made by Sigismund, and invaded Poland with his whole army. Sigismund revenged himself by invading Russia; until these mutual desolations and ravages at last made both parties desirous of peace, and a truce for three years was agreed on; during which the king of Poland died, and with him ceased the house of Jagellon, which had governed Poland nearly 200 years.

A vast number of intrigues were now set on foot at the courts of Vienna, France, Saxony, Sweden, and Brandenburgh, to establish a prince on the throne, the diet consulting only their own interest, and being ready to sell themselves to the best bidder. The Protestants having by this time obtained a considerable footing in the kingdom, religious disputes were also intermingled with political. One good effect, however, flowed from this; a law was passed that no difference in religious opinions should disqualify any Pole from holding public offices; and that the future kings should swear to cultivate the internal tranquillity of the realm. While each of the candidates was attempting to support his own interest, John Crososki, a Polish gentleman of great merit, but diminutive stature, had just returned from France. He owed many obligations to the duke of Anjou; whom he represented in such favorable terms, that the Poles decided on making him king, and Charles IX. promoted the scheme. Accordingly it was stipulated that he should marry the princess Anne, sister to the late monarch; and, every thing being settled, the young king quitted France, attended by a splendid retinue, and was received and crowned with great solemnity at Cracow. Scarcely was he seated on the throne, however, when by the death of Charles IX. he became heir to the crown of France: on his setting out for that country, the Poles were much exasperated against his whole nation, so that all the French in Cracow would have been massacred if the magistrates had not furnished them with guards. Henry endeavoured to apologise for his behaviour; but nothing could satisfy the Poles; who, on the 15th July 1575, solemnly divested him of the regal dignity, and declared the throne vacant. Commotions and factions were now again the order of the day. One principal part at last proposed Maximilian emperor of Germany; another was for electing the princess Anne, and marrying her to Stephen Batori prince of Transylvania. The latter prevailed, through the courage of one gentleman, who, in imitation of the Roman tribunes, stood up in full senate and opposed the proclamation of Maximilian as illegal. Both parties wrote to the princes whose cause they had espoused, intreating them to come and take possession of the throne. Batori proved the more alert; for, while Maximilian was disputing about certain conditions which the Poles stipulated, the former entered Poland, married the princess, and was crowned on the 1st of May, 1576.

Dantzic, however, adhered to the interest of Maximilian even after he was dead, and had the presumption to demand from the king an oath acknowledging their independence. Batori re-

ferred them to the senate, admonishing the citizens to avoid all occasions of a civil war. But his remonstrances were vain; and the Dantzickers were deaf to his proposals, until he declared them rebels, and sent against them a body of troops, who defeated them with the loss of 8000 men killed, and many prisoners. In the mean time the czar of Muscovy laid siege to Revel; but, failing, ravaged Livonia in a dreadful manner. This did not hinder Stephen from laying siege to Dantzic in person, with the utmost vigor. Collen, the Dantzic general, made many sallies, in several of which he defeated the Poles: but, happening at last to be killed, the citizens were obliged to surrender at discretion. The terms which the king demanded were, that they should ask his pardon, dismiss their troops, and rebuild the monastery of Olivia, which they had destroyed; while he, on the other hand, confirmed all their privileges, and granted them full liberty of adhering to the confession of Augsburg. The king could now direct his whole strength against the czar, who had made himself master of several important places in Livonia, and whose whole course was marked by unparalleled outrages. Such was the horror inspired by his perfidy and cruelty that the inhabitants of Wender chose rather to bury themselves in the ruins of their town, than to submit. In 1578 a body of forces was despatched into the province, the towns of Wender and Dunnenburg were surprised, and an army sent by the czar to the former was defeated. Livonia was also invaded by the Swedes, who professed to be enemies to both parties, and were scarcely inferior in cruelty to the Russians.

Stephen having made great preparations, and called to his assistance Christopher prince of Transylvania, took the field in person against the Muscovites, and laid siege to Polocz. The Russians no sooner heard of his approach than, to strike terror into the enemy, they put all the citizens to death. When Stephen came near the town, the river was dyed with blood, and a vast number of human bodies fastened to planks, and terribly mangled, were floating down the stream. Finding that cannon made little impression upon the walls, the irritated Poles rushed to the assault with burning torches, and reduced the fortifications to ashes. After the reduction of Polocz, Batori continued the war with great success. Two detachments of his army penetrated the enemy's country by different roads, wasting all before them to the gates of Smolensko, and returned with the spoils of 2000 villages. The czar at length was obliged to sue for peace; which he obtained on condition of relinquishing Livonia, after having thrown away the lives of more than 400,000 of his subjects in attempting to conquer it. Stephen, thus freed from a most destructive and cruel war, applied himself to the internal government of Poland. He made the Polish cavalry formidable to the Turks and neighbouring nations; and founded the military establishment, which the Poles named quartienne; because a fourth part of the revenue was employed in supporting it. Batori sent a body of cavalry towards the frontiers of Tartary, to check the incursions of those barbarians; by which means the Ukraine, a vast tract of desert country, was filled with flourishing towns and villages, and became a strong barrier against the Turks, Tartars, and Russians. His last memorable action was attaching the Cossacks to Poland. He presented them with the city of Techtemeravia, on the Boristhenes, which they formed into a magazine, and made the residence of their chieftains; gave them officers of all degrees, established discipline among them, altered their arms, and formed them into a regular militia, which performed eminent services to the state. All kinds of manufactures then known in Poland were likewise established among the Cossacks. While Batori was thus laudably employed, the Swedes broke the convention into which they had entered with Poland, and were on the point of getting possession of Riga. To this, indeed, Batori himself had contributed by attempting to impose the Romish religion upon the inhabitants of that city which was on the point of admitting a Swedish garrison. Upon this treason he resolved to take exemplary vengeance, but before he could execute it he died, in 1586, in the tenth year of his reign, aged fifty-four.

Four different candidates now appeared for the crown, viz., the princes Ernest and Maximilian of the house of Austria; Sigismund prince of Sweden, and Theodore czar of Muscovy. Each of these had a separate party; but Sigismund and Maximilian were so near a par that in 1587 both were elected. The consequence was a civil war; in which Maximilian was defeated and taken prisoner: and thus Sigismund III., De Vasa, became master of the throne. He waged a successful war with the Tartars, was otherwise prosperous, and succeeded to the crown of Sweden; but he found it impossible to retain both kingdoms, and he was formally deposed from the Swedish throne. In 1610 he conquered Russia, and placed his son on the throne; but the Polish conquests of that country were always precarious. Accordingly the young prince was soon after deposed; and the Russians began to make encroachments on Poland itself. A very unfortunate war also took place with Sweden, now governed by the great Gustavus Adolphus; the particulars of which will be found related under SWEDEN. At last Sigismund, worn out with cares and misfortunes, died in 1629.

After Sigismund's death the affairs of Poland seemed to revive under Uladislaus VII.; he obliged the Russians to sue for peace, and Sweden to restore some of her conquests: but, having attempted to abridge the liberty of the Cossacks, they revolted. The war was not terminated in the lifetime of Uladislaus, who died in 1648. His brother and successor, John Casimir, concluded a peace with these dangerous enemies: but ere this was effected the Russians took the opportunity of invading and pillaging Lithuania. In a little time after the whole kingdom was subdued by Charles X. of Sweden. Happily for Poland, however, a rupture took place between the courts of Sweden and Copenhagen; by which means the Poles were enabled to drive out the Swedes in 1657. The king resigned the crown in 1668. For two years after Poland was one scene of

confusion; but on the 17th of September, 1670, Michael Coribut Wiesnowiski, collaterally descended from the house of Jagello, but in a very mean situation, was chosen king. His reign continued but for three years; during which John Sobieski, a native Polish general, gave the Turks a dreadful overthrow. Of 300,000 only 15,00C escaped, the rest being all either killed or taken: however, the Polish soldiers, being bound by the laws of their country only to stay a certain time in the field, refused to pursue this signal victory. Wiesnowiski died before the news of this transaction reached Cracow; and after his death a new scene of confusion ensued, till at last, in 1674, Sobieski was elected king.

John Sobieski, by his valor and good conduct, retrieved the affairs of Poland, and entirely checked the progress of the Turks. These barbarians were every where defeated (see TURKEY), but, notwithstanding his great qualities, Poland was now so thoroughly pervaded by the spirit of anarchy, that the latter part of his reign was involved in perplexity and cabal. Sobieski died in 1696; and with him fell the independence of his country. Most violent contests took place about the succession; the recital of which would far exceed our limits. At last Frederick Augustus I., of Saxony, prevailed; but yet, as some of the most essential ceremonies were wanting in his coronation, because the primate, who was in an opposite interest, would not perform them, he found it extremely difficult to reduce his subjects to obedience. To add to his misfortunes, having engaged in a league with Denmark and Russia against Sweden, he was attacked with great fury by Charles XII. Though Augustus had not been betrayed, as indeed he almost always was, he was by no means a match for the ferocious Swede. The particulars of this war, however, which ended in the conquest of Poland, as they make great part of the exploits of that northern hero, more properly fall under SWEDEN. Here we need only observe that Augustus was reduced to the humiliating necessity of renouncing the crown of Poland on oath, and of congratulating his rival Stanislaus Leczinski upon his accession to the throne, 12th of September 1733: but, when the power of Charles was broken by his defeat at Pultowa, the fortunes of Augustus revived; Stanislaus was driven out; and the former, being absolved from his oath by the pope, resumed the throne of Poland.

Surrounded by great and ambitious powers, the Polish nation now sunk under the weight of their rapacity. On the 5th of October, 1763, died Frederick II. elector of Saxony, and king of Poland. He was succeeded by count Poniatowski, a Polish grandee, who was proclaimed, September 7th, 1764, by the name of Stanislaus Augustus, and crowned on the 25th of November, the same year.—During the interregnum, between the death of Augustus II. and the election of Stanislaus, a decree had been made by the diet, with regard to the Dissidents or Dissenters from the popish religion. By this decree they were prohibited from the free exercise of their religion, and totally excluded from all posts and places of authority. On this several of the European powers interposed, but the decree was confirmed by the coronation diet held after the king's election. In October 1766 the declarations from the above courts were presented to Stanislaus Augustus, at an ordinary diet, requesting the re-establishment of the dissidents in their civil and religious rights. But the Popish party insisted on a confirmation of the decrees made against them. At last, after violent disputes, the business was referred to the bishops and senators. About this time the court of Petersburg, which had previously sent a small body of Russian troops to within two miles of Warsaw, added to them a force of 15,000. The Dissidents, being thus assured of the protection of foreign powers, entered, on the 20th of March 1767, into two confederacies, at Thorn and Sluck; one signed by those of Great and Little Poland, the other by those of Lithuania. The cities of Thorn, Elbing, and Dantzic, acceded to the confederacy of Thorn, April 10th, and the duke and nobles of Courland to that of Sluck, May 15th. The empress of Russia, and king of Prussia, continued to issue forth new declarations in favor of the dissidents, and the Russian troops of Poland were soon augmented to 30,000 men. Other confederacies were also formed in different parts. All of them published manifestoes, in which they advised the inhabitants to treat the Russians as their defenders. The Catholics were equally active. The pope also sent exhortations to the king, great chancellor, and nobility, &c. On the 26th of September, 1767, the confederacy of dissidents and that of the malcontents were united in prince Radzivil's palace. A few days after the Russian troops in the capital were reinforced. On the 5th of October an extraordinary diet was held, but the affairs of the dissidents met with so much opposition that it was adjourned to the 12th. Next day, the 13th, the bishops of Cracow and Kiow, the palatine of Cracow, and the Staroste of Dolmski, were carried off by a Russian detachment. The crime alleged against them, in a declaration published by the prince, was, that 'They had been disrespectful to the empress of Russia, in attacking the purity of her intentions towards the republic, though she was resolved to continue her protection and assistance for preserving the liberties of Poland, and correcting all abuses,' &c.

The innovations above mentioned soon produced a civil war, which at last ended in the utter ruin of the kingdom. In the beginning of 1768 was formed the confederacy of Bar. The intention of it was to abolish, by force of arms, the constitutions in favor of the dissidents. Similar confederacies were quickly entered into throughout the kingdom: the clergy excited all ranks of men to exert themselves in defence of their religion; and with such success that even the king's troops could not be trusted to act against them. Great cruelty was exercised against the dissidents where there were no Russian troops to protect them. Towards the end of October, 1769, prince Martin Lubomirski, one of the southern confederates, who had been driven out of Poland, and had taken shelter with some of his adherents among the mountains of Hungary, posted a manifesto on several of the churches of Cracow, in which he invited the nation to a

general revolt, assuring them of the assistance of the Ottoman Porte, with whom he pretended to have concluded a treaty. This was the beginning of hostilities between the Turks and Russians, which were not terminated but by a vast effusion of blood. Poland was the first scene of this war, and was soon reduced to the most deplorable situation. In the end of 1768 the peasants of the Greek religion in the Polish Ukraine, and province of Kiow, took up arms, and committed the greatest ravages, having, they said, been threatened with death by the confederates unless they would turn Roman Catholics. Against these insurgents the Russians employed their arms, and made great numbers prisoners. The rest took refuge among the Hadamacks; by whom they were soon joined, and in the beginning of 1769 entered the Ukraine in conjunction with them, committing every where the most horrid massacres. Here, however, they were at last defeated by the Polish troops, at the same time that several of the confederacies in Poland were severely chastised. Soon after, the Chan of the Crim Tartars, having been repulsed with loss in an attempt upon New Servia, entered the Polish territories, where he left many frightful marks of his progress. Matters continued much in the same way during the rest of 1769; and in 1770 skirmishes often happened between the Russians and confederates, in which the latter were always worsted.

In 1770 a considerable number of the confederates of Bar came to an accommodation with the Russians, who took them under their protection. Agriculture, in the mean time, had been so much neglected that the crop of wheat was very deficient. This encouraged a number of desperadoes to associate under the denomination of confederates, who were guilty of still greater excesses than their predecessors. Thus a great part of the country was at last reduced to a mere desert. In 1771 the confederates sprung up afresh, and were secretly encouraged and supplied with money by France. A great number of French officers also engaged as volunteers in their service. The Austrian and Prussian troops likewise entered the country, on different sides; and the confederates found themselves in a short time entirely surrounded by those who seemed to have nothing else in view than an absolute conquest of the country. Before matters came to this crisis, however, the confederates formed a design of assassinating the king, on account of his supposed attachment to the dissidents. This extraordinary attempt was made on Sunday night September 3d, 1771, by about forty conspirators, under three chiefs, named Kosinski, or Kutsma, Lukaski, and Strawenski; who had been hired and sworn to bring the king, dead or alive, to general Pulaski, a Polish nobleman, and leader of the confederates, who planned the atrocious enterprise. Mr. Coxe, in his travels, gives a particular account of this daring outrage. The royal carriage was fired into about 200 paces from the prince Crartoriski's house, and all the king's attendants put to flight; the king was cut across the head with a sabre, seized by the collar, and dragged along the ground between horses at full gallop, for near 500 paces. The conspirators afterwards mounted him upon a horse, and rifled his pockets, when the majority dispersed, leaving only seven with him.—At last all had left him, the night being very dark, except Kosinski, who resolved to save his life, upon the king's assuring him of a pardon. They stopped at a mill, whence Stanislaus sent a line to general Coccei, informing him of his miraculous escape.

Neither the virtues nor the popularity of this sovereign could allay the factious spirit of the Poles, nor prevent the dismemberment of his kingdom. The partition of Poland was first projected, it is said, by the king of Prussia. Polish or Western Prussia had long been an object of his ambition: exclusive of its fertility, commerce, and population, its local situation rendered it highly valuable to him, as it lay between German and Eastern Prussia. Frederick pursued his object, however, with all the caution of an able politician. On the commencement of the troubles of Poland he showed no eagerness to interfere; and, although he had concurred with the empress of Russia in raising Stanislaus Augustus to the throne, yet he declined taking any active part in his favor against the confederates. Afterwards, in 1769, when the whole kingdom became convulsed, and desolated at the same time by the plague, he, under pretence of forming lines to prevent the spreading of the infection, advanced his troops and occupied Polish Prussia. Though now master of the country, and by no means apprehensive of any resistance from the Poles, yet, as he was aware that the security of his new acquisition depended upon the acquiescence of Russia and Austria, he planned the partition of the rest of this unhappy country. He first communicated this project to the emperor, either on their interview at Niess in Silesia, in 1769, or in that of 1770 at Neustadt in Austria. To induce the empress of Russia to acquiesce he despatched his brother Henry to Petersburg, who suggested to her that the house of Austria was forming an alliance with the Porte; that, nevertheless, the friendship of that house was to be purchased by her acceding to the partition, &c., until Catharine, anxious to push her conquests against the Turks, closed with the proposal, and received 'nothing loth' her famous portion of the Polish territories. The treaty was signed at Petersburg in February 1772, by the Russian, Austrian, and Prussian plenipotentiaries. The courts of London, Paris, Stockholm, and Copenhagen, remonstrated against the usurpation; but remonstrances without assistance were useless. Poland submitted to the dismemberment, not without the most violent struggles, and now for the first time felt and lamented the fatal effects of her discord and disunion. A diet being demanded, by the partitioning powers, to ratify the cession of the provinces, it met on the 19th of April 1773; and such was the spirit of the members, that, notwithstanding the deplorable situation of their country, and the threats and bribes of the three powers, the treaty was not carried through without great opposition. For some time the majority of the nuncios appeared determined to oppose the dismemberment, and the king firmly

persisted in this resolution. But by menaces of pillaging Warsaw; by bribes, promises, and threats, the members of the diet were at length prevailed on to perform the parricidial act and ratify the dismemberment. Of the dismembered countries, the Russian province is the largest, the Austrian the most populous, and the Prussian the most commercial. The partitioning powers, however, did less injury to the republic by dismembering its fairest provinces, than by perpetuating the principles of anarchy and confusion, and establishing on a permament footing that aristocratic kind of liberty which is the parent of faction, and has proved the final ruin of the republic. Under pretence of amending the constitution, they confirmed all its defects, and took effectual precautions to render this unhappy country incapable of emerging from its deplorable state.

That the virtuous and accomplished Stanislaus should have labored to extricate himself and the great body of the people from such unparalleled oppression, and that the more respectable part of the nation should have wished to give themselves and their posterity a better form of government, was very natural and meritorious. The influence of the partitioning powers was indeed exerted to make the king contented with his situation. His revenues, which before did not exceed £100,000, were now increased to three times that sum. The republic likewise agreed to pay his debts, amounting to upwards of £400,000. It bestowed on him also, in hereditary possession, four starosties, or governments of castles, with the districts belonging to them; and reimbursed him the money he had laid out for the state. It was also agreed that the revenues of the republic should be enhanced to 33,000,000 of florins (near £2,000,000 sterling), and the army should consist of 30,000 men. Soon after the conclusion of the peace with Turkey, the empress of Russia also made the king a present of 250,000 rubles, as a compensation for that part of his dominions which fell into her hands. These bribes, however, were not sufficient to blind the eyes of Stanislaus, or to cool the ardor of his patriotism. He labored for posterity, and with such apparent success that on the 3d of May, 1791, a new constitution of the government of Poland was established by the king, together with the confederate states assembled in double number to represent the Polish nation. That this was a perfect constitution, we are far from thinking; but it was probably as perfect as the inveterate prejudices of the nobles would admit of. It deviated as little as possible from the old forms, and was enacted and agreed to with the approbation of all ranks.

But a few of the corrupt nobles, perceiving that it would curb their ambition, deprive them of the base means which they had long enjoyed of gratifying their avarice by setting the crown to sale, and render it impossible for them to continue with impunity their oppression of the peasants, protested against it, and withdrew from the confederates. They also preferred their complaints to the empress of Russia, who, ready on all occasions and on the slightest pretence to invade Poland, poured her armies into the republic, and, surrounding the king and the diet with soldiers, compelled them by the most furious and indecent menaces to undo their glorious labor, and to restore the constitution as settled after the partition treaty. Of the progress of the Russians in this work of darkness we cannot find room for a detailed account.

On the 18th May, 1792, the Russian ambassador delivered a declaration, which was worthy of such a cause. It was a tissue of falsehood and hypocrisy. It asserted that this wanton invasion, which was against the sense of every Polander, was meant entirely for the good of the republic. It censured the precipitancy with which the new constitution was adopted, and ascribed the ready consent of the diet to the influence of the Warsaw mob. It represented the constitution as a violation of the principles on which the Polish republic was founded—complained of the licentiousness with which the sacred name of the empress was treated in some speeches of the members; and concluded by professing that on these accounts, and in behalf of the emigrant Poles, her imperial majesty had ordered her troops to enter the territories of the republic, &c. The spirit manifested by some of the nobility was now truly honorable. They delivered in their plate to the mint: prince Radzivil engaged to furnish 10,000 stand of arms, and another a train of artillery. The courage of the new and hastily embodied soldiers corresponded with the patriotism of their nobles. Poniatowski, nephew to the king, was appointed commander-in-chief; and, though his force was greatly inferior to that of the enemy, it must be confessed that he made a noble stand. On the 24th of May the enemy's Cossacks were repulsed and pursued by the patroles of the republic. On the 26th, about one o'clock, the piquets discovered a large body approaching the outposts; and a squadron of cavalry, commanded by lieutenant Kwasniewski, supported by lieutenant Golejowski, with two squadrons more, in all about 300, marched out to meet them. They attacked the Cossacks with success, but pursued them with more valor than prudence to the side of a wood, where they found themselves drawn into an ambuscade, and surrounded by 2000 horse. The intrepid Poles bravely fought their way through the Russian lines, and killed upwards of 200 of the enemy; but in this engagement Kwasniewski was wounded and made prisoner. The remainder of the detachment reached their quarters in safety. All the history of man does not furnish a greater instance of perfidy, meanness, and duplicity than that of the conduct of Prussia on this occasion. A treaty of defensive alliance had been solemnly contracted between the republic of Poland and the king of Prussia, by which it was expressly stipulated, 'That, in case of menace or invasion from any foreign power, they shall assist each other with their whole force, if necessary. Instead, however, of assisting Poland, Prussia insultingly recommended her to retrace her steps; in which case she said that she would be ready to attempt an accommodation in her favor. This attempt was never made, and probably never intended; for the empress pursued her measures. On the 10th of June general Judycki, who commanded a detachment of the Polish troops between Mire

and Swierzna, was attacked by the Russians; but, after a combat of some hours, he obliged them to retire. On the succeeding day and on the 14th the Russians rallied again to the attack; when, after various fluctuations of success, the Poles under prince Joseph Poniatowski commenced a retreat. During their march their rear was harassed by a body of 4000 Russians, till, arriving at Boruskowee, the wooden bridge unfortunately gave way under the weight of the cavalry. The enemy in the mean time brought their artillery to play upon the rear of the fugitives. The Polish army next directed its course towards Zielime, where meeting, on the 17th, with a reinforcement from Zaslow, it halted to give battle to the enemy. The Russians were upwards of 17,000 strong, with twenty-four pieces of cannon, and the force of the republic much inferior. After a furious contest from 7 A. M. till 5 P. M. the Russians were at length obliged to retreat, and leave the field of battle in possession of the patriots. The Russians were computed to have lost 4000 men in this engagement, and the Poles about 1100. Notwithstanding these exertions the Poles were compelled gradually to retire before their numerous and disciplined enemies. Nieswez, Wilna, Minsk, and several other places of less consequence, fell into their hands one after another. On a truce being proposed to the Russian general, Kochowski, the proposal was haughtily rejected; while the desertion of vice brigadier Rudnicki, and some others who preferred dishonor to personal danger, proclaimed a tottering cause. The progress of the armies of Catharine was universally marked with devastation and cruelty; such was the hatred of the people that even as they approached the country all around became a wilderness. Prince Poniatowski continued to retreat, and on the 17th of July his rear being attacked by a very superior force, it suffered a very considerable loss, though the skill and courage of general Kosciusko enabled him to make a respectable defence. On the 18th a general engagement took place between the two armies. The Russian line extended opposite Dubienka, along the Bog, as far as Opalin. The principal column, consisting of 14,000 men, was chiefly directed against the division of general Kosciusko, which consisted of 5000 men only. After a most vigorous resistance, in which the Russians lost upwards of 4000 men, and the troops of the republic only some hundreds, the latter were compelled to give way before the superior number of the enemy, and to retire farther into the country. This unequal contest was at last prematurely terminated. The king, whose benevolent intentions were, perhaps, overpowered by mental imbecility, and whose age and infirmities rendered him unequal to the difficulties and dangers of a protracted war, instead of putting himself, according to his first resolve, at the head of the army, determined to surrender at discretion. On the 23d of July he summoned a council of all the deputies at that moment in Warsaw. He laid before them the last despatches from the empress, which insisted upon total and unreserved submission. He pointed out the danger of a dismemberment of the republic, should they delay to throw themselves upon the clemency of the empress, and to intreat her protection; and mentioned the fatal union of Austria and Prussia with Russia; together with the disgraceful supineness manifested by every other court in Europe. Four citizens only, the intrepid and patriotic Malachowski, and the princes Sapieha, Radzivil, and Soltan, vehemently protested against these proceedings; the following evening a company of gentlemen from the provinces assembled for the same purpose. This assembly waited immediately on the four distinguished patriots, and returned them their acknowledgments for the spirit and firmness with which they had resisted foreign despotism: and the submission of the king to the designs of Russia was no sooner made known than Poland was bereft of all her best and most respectable citizens. Malachowski as marshal of the diet, and prince Sapieha grand marshal of Lithuania, entered strong protests on the journals of the diet against the royal proceedings, and declared solemnly that the diet legally assembled in 1788 was not dissolved. But on the 2d of August a counter confederation was formed at Warsaw, of which the grand apostate Potocki was chosen marshal. The acts of this confederation were evidently the dictates of Russia, and were calculated only to restore the ancient abuses, and to place the country under a foreign yoke. At this moment the sympathy of the people of Great Britain for Poland was evinced by a liberal subscription of every party and sect for the purpose of assisting the king and the republic to maintain their independence.

Not satisfied with restoring the old constitution, the empress of Russia seized upon that part of the territory which, at the last partition, she and her coadjutors had left to the republic; and her ambassador, entering into the diet with a crowd of armed ruffians, compelled the king and that assembly to grant the form of legality to her usurpations. The nation, however, did not submit. General Kosciusko kept together a few heroes, whom he was soon enabled to augment to the number of an army. 'Painful as is the task,' says a historian of this tragedy, 'we have now to enter on the detail of the blackest scene of perfidy and wickedness which the annals of Europe have to record: a detail disgusting in its progress, cruel and sanguinary in its catastrophe, beyond all former precedent. On the 6th January 1793 the king of Prussia published a declaration respecting the march of his troops into Poland. In this, with unblushing effrontery, and in direct contradiction to the letters he had himself written to the unfortunate Stanislaus, congratulating him on the change of government in May 1791, he asserted that 'this change had been effected without the knowledge of the neighbouring friendly powers. The revolution had, he added, been beheld with much displeasure by a great part of the nation, who had implored and happily received the assistance of her imperial majesty of Russia, whose troops were co-operating with the confederated nobility for the suppression of innovation, and the restoration of virtue to the constitution. He hoped that the troubles of Poland would have termi-

nated without his interference, but that the obstinate resistance of the soi-disant patriots, and the jacobinical proceedings, especially in Great Poland, obliged him to take effective measures for his own safety. He had therefore concerted measures with the courts of Vienna and Petersburgh, and had resolved to send a body of troops under general Mollendorf into Great Poland.' Whatever factions existed in Poland previous to the Russian invasion they remained undiscovered by any eye, except that of the Prussian monarch. To the rest of Europe it appeared that the new constitution of Poland was received with applause by the unanimous voice of the whole nation, and produced real satisfaction among all ranks, except a few of the nobility who were either basely devoted to the court of Russia, or disappointed by being precluded from the chance of succeeding to the throne. The Prussian troops, however, advanced to Thorn, and, being refused entrance, attacked it with cannon, broke open the gates, dislodged the guards, and took possession of it on the 24th of January. Different Polish detachments, dispersed throughout Great Poland, were attacked at the same time, and driven from their posts. Dantzic, which had already suffered considerably by the oppressions of its neighbours, soon became subjected to the Prussians, and 1700 men were quartered upon the citizens. On the 3d of February the confederated Poles published a protest against the violent entrance of the Prussian troops, in which they complained of the breach of the most solemn engagements by those who were bound by treaties to give them all possible assistance. This confederation, which sat at Grodno, sent a note on these subjects, dated 6th of February, to count De Sievers, the Russian ambassador, to be communicated to the empress, entioning that an alarm of an intended new partition was general in Poland, and trusting to her majesty's friendship and good-will to quiet the alarms of the people, and concluding, that the confederation had sworn to maintain the unity and indivisibility of the republic. But, on the 24th February, they were insulted by a new manifesto of the king of Prussia, informing them that the same motives which had induced him to send troops into Great Poland, had led him to make sure of Dantzic and its dependencies. In this manifesto he also charged the city with 'having become the seat of an audacious sect, in close connexion with the rebels of France; and therefore he had ordered his lieutenant-general Raumez to take possession of Dantzic for the preservation of good order.' In consequence of all this the burgomaster and council of Dantzic, at the kind request of the king of Prussia, on the 2d April ordered all the inhabitants to keep quiet. The second partition of this unfortunate country was now rapidly approaching.

It was preceded by manifestoes from the royal and imperial robbers. The declaration of the emperor of Germany was dated Vienna, February 14th, and was couched in terms of great forbearance, but contained an absolute injunction to the Poles in his dominions placidly to regard the dismemberment of their country. In March the manifesto of the empress of Russia appeared. Religion was, as usual, called in to sanction this atrocious act of rapine and injustice, and Catharine humanely lamented the sufferings of the Poles, among whom she had endeavoured for thirty years to preserve tranquillity, &c. To provide, therefore, for the future safety of the Polish dominions, and to prevent all further changes, she graciously intended to take for ever, under the sceptre of Russia, those lands, with their inhabitants, which lie between Druy, on the left bank of the Dwina, to Neroch and Dubrova, and following the border of the waiwodship of Vilna, to Stalptsa, to Nesvig, and then to Pinsk; thence passing Kunish, between Viskero and Novogreble, near the frontier of Gallicia; thence to the Dniester, and terminating in the old border of Russia and Poland at Iegertie.' In this partition, 'the increase of the happiness of the inhabitants was avowed to be the sole object of her imperial majesty.' The declaration of the Prussian monarch, which was dated 25th March, echoed the sentiments of the Russian manifesto, and avowed that to preserve the republic of Poland from the dreadful effects of its internal divisions, and to rescue it from utter ruin, no means remained but to incorporate her frontier provinces into the states of Prussia; and therefore he had determined to take immediate possession of the cities of Dantzic and Thorn, the waiwodships of Posen, Gnesen, Kalish, Siradia, Lentschir, Rawa, and Polotsk; the city and monastery of Czentochowa; the provinces of Wielun, Cujavia, and Dobrzyn, &c. The people were further exhorted to behave as loyal subjects to Prussia, and renounce all connexion with the crown of Poland. On the 9th April the count De Sievers signed a further declaration on the part of Russia, in which, after detail ing her efforts for preserving order in Poland, and the ingratitude with which these had been received, she pours forth a torrent of invectives against the Jacobine opposers of despotism in Poland. In return to all these declarations the confederation sent a note to M. de Sievers, expressing the utmost surprise at his avowal of the intended usurpation. The ministers of Berlin and Petersburgh delivered notes to the Polish diet, demanding the appointment of a deputation to sanction the intended division, which produced violent altercations. In the sitting of June 26th it was agreed, by a great majority, to claim the mediation of foreign courts with those of Berlin and Petersburgh, to induce them to withdraw their troops, and give up the provinces of the republic. A motion was next made that the deputation demanded should be empowered to treat only with Russia, which was supported by the king, and carried by a majority of 107 against twenty-four. On the 28th the question respecting the delegation to treat with the courts of Petersburgh and Berlin was agitated, and opposed by almost the whole chamber; and an injunction was voted to the chancellors of Courland and Lithuania, to draw up answers to the notes from those courts, agreeable to this resolution. The diet was then adjourned to the 1st of July, and from that to the 15th; when a second conference took place between the depu-

ties and the Russian ambassador, and the former delivered a remonstrance against the violence committed against the deputies, many of whom had been forcibly arrested at their houses. This memorial he refused to transmit to the empress, and replied in a note full of menaces, insisting on the ratification of the treaty, to which the diet refused to accede, and prorogued its sitting to the 30th. Successive threatening notes were sent to the diet, both by the Russian and Prussian ministers; and the castle was surrounded by Russian soldiers. At last, on the 2d September, the diet came to a resolution to declare to all Europe that, in defiance of the faith of treaties, by which the dependence of Poland was guaranteed, being at that moment deprived of free-will, surrounded with an armed force, and threatened with a further invasion by Prussian troops, 'they were compelled to authorise a deputation to sign the treaty planned and amended under the dictation of the Russian ambassador.' It was further declared, in this extorted treaty, in the name of the king, that he would not give his consent, in his own name and that of the diet, but on condition that the articles should be mutually agreed to, under the guarantee of the court of Russia. The violences exercised on this occassion were exceeded by those which took place during the subsequent negociation with Prussia, which was opened on the 23d September by the Russian ambassador; who, previous to the sitting, arrested four of the representatives; and stationed grenadiers in the avenues to the castle, which was surrounded with troops.

Poland, thus reduced to one third of her force and extent, lost a proportionate part of her revenues. In the session of the 23d November a plan was adopted of raising two loans, under the guarantee of the empress of Russia; one for 27,000,000 of Polish florins, to discharge the king's debts; the other of 10,000,000, for the use of the republic. The finances of the republic were limited in future to 16,000,000 a year, ten of which were to be contributed by the remainder of the Polish provinces, and six by the remnant of Lithuania, to defray the support of the king, and the expenses of the civil list and army. The termination of the diet of Grodno was marked by turbulence and precipitation. The new constitution, though partly opposed by some of the nuncios, experienced little alteration, and its acceptation was formally announced. The two last sessions were tumultuous, and every effort was exerted by the opponents of Russia, but in vain.

At last these repeated and unparalleled oppressions excited the latent patriotism of the Poles. Early in February the intrepid Kosciusko appeared at the head of a considerable body of insurgents, attacked the Prussians, forced them to retreat, and pursued them to a great distance. The Russians having evacuated Cracow, on the 23d of March, Kosciusko took possession of it on the 24th, and next morning ordered the gates to be shut, and proclaimed himself commander in chief of all the forces of Poland. He then imposed an oath of fidelity on all the military in the city, took possession of the public treasure, and proceeded to measures of military sequestration. On the 25th he issued a proclamation, in the most energetic terms, inviting the nation to shake off its fetters. This proclamation was received with great applause. Kosciusko was conducted to the town house, presented to the chief nobility, and by them formally invested with the title of general, while every thing was abundantly supplied for the support of his army. On the 26th a revolutionary tribunal was established, composed of fourteen members, and every five houses were required to furnish one man armed and equipped for the defence of the constitution against the usurping powers. The corporation then assembled before the town-house, whence the magistrates led them to the church of the Holy Virgin, where the constitution of the 3d of May, 1791, was publicly read, and an oath taken to defend it. Kosciusko then issued another proclamation, exhorting the Poles to respect the dominions of the emperor; and the Austrian generals on the frontiers were officially informed that, if any violence were committed on the emperor's subjects, the revolutionary government would procure immediate indemnification. Warsaw was now in the highest state of fermentation. There were no fewer than 15,000 Russians in the city: where the permanent council decreed the insurgents rebels, and subjected them to the most arbitrary punishments. The king issued a proclamation exhorting his subjects to a peaceable acquiescence in the established order of things, and urging the danger and destruction of resistance. In the mean time the nobles who had taken the oaths before Kosciusko went to their respective estates to assemble and arm their vassals. Baron Ingelstrohm about this time surrounded the diet at Warsaw with a military force, and demanded the surrender of the arsenal. This was refused, and notice being sent to Kosciusko, he, about the end of March, set out for Warsaw with his army, and a reinforcement of 4000 peasants armed with pikes, &c. On the 4th of April he was met by a detachment of 6000 Russians, with a park of heavy artillery. A fierce battle ensued. The Polish peasants, in desperate valor, made a dreadful carnage of the enemy: general Woronzow was taken prisoner. and 1000 Russians killed; while the Poles are said to have lost only sixty men, and took eleven pieces of cannon. After the battle Kosciusko proceeded, with his army, to Craycovy, where he was joined by a great body of disaffected Poles. Early on the 17th a commotion took place at Warsaw which ended in the citizens seizing the arsenal and after a bloody conflict expelling the Russians. The Poles set fire to several houses in the city, to dislodge the remaining enemies, and a dreadful slaughter and pillage ensued. The king's situation after this became critical: a new regency kept no measures with the agents of Prussia and Russia, and the people were jealous of every motion of the king. They made him promise, repeatedly, that he would not quit Warsaw; placed two municipal officers as a guard on him, and desired him often to show himself to the people. The amiable monarch not only complied with these requests, but entered with such ardor into the national cause as to send the half of his silver plate to the mint, and 1000 ducats to

the military chest. The other half of his plate he devoted to the relief of the families of those patriots who had perished on the 17th and 18th of April.

By the advice of Kosciusko, on the 29th May, the provisionary council was abolished, and a national council instituted in its stead, under the direction of the king, who engaged never to separate his interests from those of the nation. In the mean time the Polish army daily increased, and the empress sent 40,000 Russians from the Ukraine, and 16,000 from Livonia, to oppose its progress. In the end of May Kosciusko's troops amounted to 22,970 men; that of general Kochowski to 18,000; that of Jassinski at Grodno to 6000; another corps of 12,000 were stationed at Wilna; and another of 8000 at Warsaw; besides great numbers of peasants not included. Not to mention various skirmishes, which in general ended in favor of the Poles, a Prussian army under general Elsner on the 15th of June took Cracow, Kosciusko not being able to move to its relief; after which Elsner joined the Prussian monarch, who arrived at Killee on the 25th, joined the Russian forces, and soon after encamped near Warsaw. The citizens, enraged at so near an approach of their enemies, sacrificed several of those delinquents who had been convicted of treason, among whom were some persons of the most distinguished rank. To conciliate the Russians, however, a proclamation was issued, permitting the free use of the Greek religion. Another was issued, setting forth, that, as the Polish revolution took place upon principles quite distinct from those of the French, all authorities should be respected, and the king treated with the honor due to his rank. In the end of June a manifesto was issued by the emperor on his troops entering Poland. On the 12th of July the head-quarters of the king and prince of Prussia were only ten miles from Warsaw. Meantime Kosciusko having eluded that army, and defeated another party of Prussians, had got into Warsaw. On the 31st of June the Prussians began a heavy cannonade on that city; a dreadful fire was kept up on it by night and day, and an incredible number of lives were lost. Both king and prince were in imminent danger. Four entrenched and connected camps, under Kosciusko, Dambrowski, Zajaczeck and Moknorowski, were placed before Warsaw. Kosciusko and Madalinski were stationed at Mokatow; Dambrowski was opposed to the Russians at Czerniaco; Zajaczeck to the Prussians at Wola; and Moknorowski with prince Jos. Poniatowsky to the Prussians at Gurce. About this time the Poles obtained some considerable advantages over the Russians at Liebau, and Kerzniniec in Volhynia. In Great Poland the Poles had imprisoned the Prussian troops, thrown down the Prussian eagles, and plundered the military chest. On the 22d general Marawsky arrived with 10,000 men; the provinces of Posnania, Gnesen, and Kaffish, took up arms in his favor, and success attended the Poles in every quarter. Near Warsaw, however, the Prussians had carried some Polish redoubts. On the night of the 5th of September the Prussians and Russians abandoned the seige of Warsaw, after a fruitless attack of two months, much disabled by want of provisions, &c. The king of Prussia retreated to his own dominions in three columns, leaving the sick and wounded at the mercy of the Poles. Meantime the Russian corps, to the number of 10,000, retreated to Lublin. Early in September news was received in Warsaw of the success of the Poles in Lithuania; but about the same time the Russian grand army of 20,000 men arrived in Poland; and on the 18th a bloody engagement took place near Brzesk, in which the Poles lost great numbers, and were forced to retreat across the Bog. They were successful, however, against a party of Prussians at Kamiona, and their numbers still increased in Great Poland. Bomberg was taken by the brave Madalinski, and Kosciusko next turned his views to Lithuania, but hearing of the defeat at Brzesk, and that Suwarrow was marching to Warsaw, he resolved to meet him. Hearing that Fersen intended to join him, he advanced with 6000 men to prevent that junction; and on the 10th of October a dreadful battle took place. The Russians advanced twice, and were twice repulsed; but the Poles, leaving their favorable position on the heights, boldly pressed on, till the Russians forming anew, and turning back on their pursuers, the rout became general, though Kosciusko flew from rank to rank in the hottest of the engagement, and had three horses killed under him. At length he fell, and was wounded by a Cossack. He rose, but was again knocked down by a Cossack, who was aiming at him a mortal blow, when his arm was held by the Russian general Chrnozazow, whose wife Kosciusko had lately allowed to depart from Warsaw, Kosciusko requested death, but the general preferred taking him prisoner. The Polish infantry continued to fight with furious valor. This disaster excited universal regret at Warsaw, yet the Supreme Council published a spirited proclamation, exhorting the Poles to remember their motto, Liberty or Death! to preserve their union, and redouble their efforts. The Russians under Fersen soon after summoned Warsaw, and on being refused, after joining all the corps under Fersen, Dernfeld, Denisow, and Suwarrow, they on the 4th of November attacked the suburb of Prague, separated from Warsaw by the Vistula, and defended by above 100 cannon. The ferocious Suwarrow ordered his soldiers to mount to the assault as they had done at Ismael, by climbing over their dead and wounded countrymen as well as their enemies, and to fight only with sabre and bayonet. The Russians obeyed his orders with savage impetuosity, and presented themselves all at once before the lines at Prague. Thus surrounded, the Polish generals found themselves unable to oppose 50,000 men with only 10,000. The cry raised by the Russians reached to the other side of the Vistula, and added to the consternation of the Poles, who were engaged with the rest of the Russian troops, and endeavoured to retreat into Warsaw, over a bridge, but were dreadfully slaughtered in the attempt. After a severe conflict of eight hours, resistance on the part of the Poles ceased: but the massacre by Suwarrow, who, from his habitual cruelty, was singled out for this butchery, continued for two hours longer; and the pillage

lasted till next day at noon: 5000 Poles were slain in the assault, the rest were imprisoned or dispersed. The citizens were now forced to lay down their arms, and their houses were plundered by the merciless Russians; who, after the battle had ceased ten hours, at nine at night set fire to the town, and again began to massacre the people; thus 9000 persons, unarmed men, defenceless women, and harmless infants, perished, either in the flames or by the sword, and nearly the whole suburb was reduced to ashes. During this siege not fewer than 30,000 Poles were put to death. In this exigence count Potocki proposed to treat with the Russians in the name of the republic; but was haughtily answered by Suwarrow, that the empress was not at war with the republic, and that his object was only to reduce her refractory subjects. Deputies were then sent from the magistrates of Warsaw to surrender the city, on the single condition of preserving their lives and property. Suwarrow insisted on the surrender of their arms. This was refused by the Polish soldiers, and their general Wawrzecki, with many others, refused to take part in the capitulation: on which the Russian general allowed the military to leave Warsaw with their arms, but threatened no quarter next time he should meet with them. On the 7th the Supreme Council resigned their authority to the king. Suwarrow on the 9th made his triumphant entry into Warsaw, during which the citizens observed a mournful silence. On the 10th he went with much pomp to pay his respects to king Stanislaus; and, to complete this execrable tragedy, the 1st of December was set apart for solemn thanksgiving, and Te Deum sung for the triumph of powerful oppression. The Polish patriots, to the number of 30,000, who refused to accede to the capitulation, went to Sandomir under Wawrzecki; but were soon forced to disband. Another corps of 6000, under Wawrzecki, Madalinski, and Dambrowski, went to Galicia. A powerful military force was stationed at Warsaw, and cannon pointed at the city in every direction to keep it in subjection. Meantime Kosciusko recovered of his wounds under the care of Madame Chrnozazow. On the 20th of December a courier arrived from the empress, demanding the arrest of count Ignatius Potocki, and several other patriots, whom she sent to Petersburg; and the same messenger brought orders to king Stanislaus to retire to Grodno; he accordingly left Warsaw on the 7th of January, 1795.

Such was the state of Poland, until, in 1806, the victories of Buonaparte brought the French hither, and led their ruler to seek additional means of aggrandisement in the independent spirit of the Poles. At the peace of Tilsit, having stripped Prussia of the greatest part of her possessions here, he gave a small portion to Russia, and erected the rest into the grand duchy of Warsaw, which he assigned to the king of Saxony. In 1809 he compelled Austria to cede part of Galicia to Russia, and a farther part to this new state. But in 1812 the Russians were enabled to occupy Poland; and the congress of Vienna, while it decreed to Austria and Prussia a partial restitution of their late cessions, confirmed to Russia all the Polish and Lithuanian provinces acquired before 1795, conferring on her, in addition, the sovereignty of the central provinces, which constitute the present kingdom of Poland. Each of the three powers was enjoined by the congress to give to its respective portion of Poland as free a constitution as circumstances should permit. In this some progress has already been made by Russia and Austria; but so backward is the state of civilisation, so debasing are the effects of long servitude, that ages must elapse before the improvement of the Poles can be effectual. The peasantry, when no longer driven to their work by compulsion, have shown themselves so obstinately indolent that the authority of the magistrates has been found necessary to inflict the blows formerly administered by the order of the landholder.

Poland, the New Kingdom of, the only portion of the foregoing country that still retains its ancient name, comprises the central provinces of Poland, or the chief part of that which, from 1807 to 1813, formed the duchy of Warsaw. It is bounded by the respective acquisitions of Russia, Austria, and Prussia. The form of this territory is a square of about 200 miles, in the middle of which stands the capital, Warsaw: there is also a detached tract extending northeast towards Lithuania. Its area is 47,000 square miles, and its population about 3,000,000, divided into the eight palatines of Cracow, Sandomir, Kalisch, Lublin, Plock, Masovia, Podlachia, and Augustow. They participate, in soil and climate, the characteristics common to Poland at large.

Though subject to the same sovereign as Russia, the kingdom of Poland is governed in every respect as a separate monarchy. The late emperor Alexander gave the Poles, in November 1815, a constitutional charter, so framed as to combine several modern improvements in legislation, with the ancient forms of the Polish constitution. Now, as formerly, there is a king, a senate, and a diet. The regal dignity is vested in the czar, represented by a viceroy, and a cabinet of ministers, in whom the executive government resides. The chief ministerial departments are those of war, finance, police, law, and education. All ministers are accountable to the senate, being obliged to lay reports before it, and to submit to its discussions, nearly in the form observed in the British parliament. The senate consists of ten bishops, ten worgwodes (palatines), and ten castellans, named by the king for life. The lower house, or chamber of representatives, of seventy-seven deputies from the provincial nobility and gentry, and of the members of the cabinet, who have seats here ex officio. The diet, on the model of the smaller Polish diet, is limited to the senate and house of representatives. Its sittings last only a fortnight; and the sovereign is not pledged to convoke it more than once in two years: its consent being only necessary to measures of national interest; namely, the imposition of taxes, and acts affecting the constitution. The revenue of this kingdom amounts to about £900,000 sterling, of which £180,000 go to the civil list. The military force is considerable in cavalry. The religion of the majority is the Catholic; but the Protestants

are numerous; and the Jews are computed to form a seventh of the population.

These statistical details were drawn up with great accuracy and applied to the state of this portion of Poland as late as the close of 1830, but a revolution, which seemed to set at defiance the whole power of the Russian empire, then broke out. Nearly the whole of the kingdom took arms against Russia; but their efforts proved finally unavailing, and on March 25, 1832, a manifesto was issued by the emperor of Russia, declaring Poland for ever incorporated with the Russian empire.

POLAR REGIONS.

POLAR REGIONS. Various causes have conspired, within a recent period, to attract attention to those immense basins of water which appear more or less to surround the poles, and unite the two great oceans of the earth. Civilisation has spread toward the northern shores both of America and of Asia; navigation and commercial speculation have extended still farther their discoveries and temporary conquests; the continent of South America has rapidly advanced in political importance, and is taking a new and most interesting station among the free and commercial governments. During this period China and the East Indies have fully maintained their interest with the western world; a shorter passage to those storehouses of wealth and luxury would, at the present time, be as acceptable to Europe as when Columbus was stimulated to seek it—while a state of general peace has for many years enabled the nations best qualified, and most disposed, to promote the science of physical geography. Russia and the United States of North America have contributed their respective quotas of exertion in this cause; but Great Britain, as by her maritime and commercial station in honor and duty bound, and more, perhaps, than in duty bound, has been foremost to explore these dark but interesting recesses of nature. She has nearly completed the boundaries of the North Polar Sea, and penetrated beyond the arctic and antarctic circle, several degrees further than any other nation.

We feel it therefore demanded of us to devote a distinct article to the progressive geography of these regions; noticing first the discoveries of navigators previous to the late expeditions from this country.; and then more particularly the result of those spirited undertakings.

NORTH POLAR REGIONS.—In geography, as in some other of the sciences, the world has been singularly indebted to the sincere pursuit of certain great errors. Columbus was thus allured to his arduous enterprise, by supposing that the East Indies extended westward to many times their present width; and, long after the discovery of the extent of the American continent, it was hoped that some opening, admitting a passage to the east, might be found. In some very early maps, preserved in the king's library, Asia and America are united throughout their whole extent.

Vesputius, Ojeda, and others, however, beat in vain round the Gulf of Mexico, and when they had traced the vast mass of the American continent stretching southward, the minds of men were reluctantly turned towards the north, as the only quarter in which to hope for a passage.

Within two years from the discovery of America by Columbus, our Henry VII. granted a commission to John Cabot, a Venetian, who resided many years at Bristol, to discover unknown lands, and annex them to the crown of England. In the spring of 1497, after steering directly west on the parallel of Bristol for three weeks, he reached a large island which he called Prima Vista, 'The First Seen,' by subsequent usage named Newfoundland. On the first day of that saint he discovered the neighbouring island St. John's, and having secured three of the inhabitants of these islands, and several of the productions, he is said to have coasted the whole of the north-east promontory of America between 38° and 56° of latitude, although it is remarkable that we hear of no continental point or place to which he gave name.

We are not unaware of the pretensions to the discovery of Newfoundland which have been urged on behalf of the Norwegian navigators of the eleventh century. The story told by Snorro, the northern historian, and once a judge in Iceland, is, that about the year 1001, as one of the Icelandic colonists, named Herjolf, was proceeding with his son Biorn, on a trading voyage, their ships were separated in a squall, and Biorn hearing, on the coast of Norway, that his father was gone towards Greenland, steered westward, with the hope of finding him, when a new and severe storm drove him to the southward many leagues, until he reached a fine open country well shaded with wood. Returning to Iceland, Biorn induced a friend and fellow-countryman, of the name of Leif, to go back with him to this new-discovered shore; on approaching which they first observed a barren, rocky island, to which they gave the name of Helleland, and a low sandy coast covered with trees extending beyond it, which they called Markland. A voyage of two days more brought them to 'a new coast of land,' to the northward of which they discovered another and very large island. Here they ascended a river which led to a lake, surrounded with woods, on the banks of which they determined to winter. They described the climate on their return as exceedingly mild and agreeable, the soil fertile, and the fish, particularly salmon, abundant in the river. In the woods they found a wild vine, which was sufficiently welcome to the settlers, to induce them to give the name of Vinland or Winland to the whole country. The shortest day they observed to consist of eight hours sun; the only circumstance of their narrative which indicates the latitude of this district, and which would very well accord with that of the eastern coast of Newfoundland; while, from the other coasts described, it would not appear improbable that

these navigators were in reality the first Europeans that reached the western continent. Such obscurity, however, rests over the circumstances of the voyage that that of Cabot has always been taken to be the first authentic discovery of Newfoundland and the neighbouring shores. We should not, indeed, have noticed this ancient record (from the Chronicle of Aldus, Stockholm, 1697) of a circumstance that had dropt from the recollection of mankind until the discoveries of Columbus, and their consequences, but for the singular fact that, after possessing and settling Newfoundland for upwards of two centuries, we have at this day no accurate acquaintance with the interior; no certain information whether there are permanent native inhabitants of the woods or not; and that in a late expedition, undertaken by captain (then lieutenant) Buchan, the commander of one of the British expeditions to the pole, that officer has thrown more light upon this subject than has ever been received in Europe since our possession of the island; and actually found a sort of lake in the country that reminds us of the scenery of this the earliest of all the supposed discoveries of America.

'If it had been Henry's purpose to prosecute the object of the commission given by him to Cabot,' says Dr. Robertson, 'and to take possession of the countries which he had discovered, the success of this voyage must have answered his most sanguine expectations. His subjects were undoubtedly the first Europeans who had visited that part of the American continent (in modern times); and were entitled to whatever rights of property prior discovery is supposed to confer.' On the return of Cabot, however, this monarch was too deeply engaged in his war with Scotland, with insurrections at home, and with a projected alliance with Spain, the sovereign mistress of both Indies, to follow up with any vigor this promising circumstance; and the reigns of his successors, of Edward VI. and of Mary, were too deeply occupied with religious disputes to allow much of the public attention to be afforded to such enterprises. Private individuals, indeed, united with much zeal in the spirit of discovery which was now diffused throughout Europe. In the reign of Henry VIII. the son of John Cabot was despatched by some Bristol merchants to the coast of Brasil, and in that of Edward VI. a company of 'merchant adventurers for the discovery of regions, dominions, islands, and places unknown,' obtained a charter from the government, and chose this celebrated navigator for their governor. In the same reign we find increasing attention directed to the fisheries of the coast of Newfoundland.

Towards the close of the fifteenth century, and in 1500 and 1501, Cortereal, a Portuguese, also sailed along the coast of Labrador, which is hence in early maps called after him Corterealis, and probably he even traced the entrance of Hudson's Bay. It is certain that he returned with sanguine hopes of discovering a passage, for he soon after set out on a new expedition; but the issue was fatal; he returned no more. His brother Miguel, who went in search of him, shared the same fate. A third, who desired to follow, was stopped by the express orders of the king. With this enterprising and unfortunate family, seems to have expired the zeal of the Portuguese for northern discoveries.

But the reign of the maiden queen was destined to extend our geographical knowledge, our navy, and our colonies, in the happiest union of efforts. Elizabeth, it is well known, directed her attention to these objects immediately on her accession. She encouraged the company of Merchant Adventurers in their attempts to discover the north-west passage to India; she cultivated the new connexion which had been accidentally opened with Russia by one of the captains; and patronised three successive voyages of Martin Frobisher to the north-east coast of America. In the first of these he reached the coast of Labrador in about six weeks, and shortly after entered the straits in lat. 63° 8′ which now bear his name. It is the Lumley's Inlet of Davis, and many writers, having Cape Walsingham on the north, and Resolution Island on the south; and has often been confounded with Hudson's Strait, the larger opening at Cape Chedley, in the south. Frobisher speaks of discovering on this coast, at a distance, 'a number of smal things floating in the sea, afarre off, which' he 'supposed to be porposes, or seales, or some kind of strange fish; but which proved to be men in their canoes, covered with skin.' Having attracted one of them toward him by the sound of a bell, which he appeared to offer as a present, Frobisher caught this 'strange infidel fast, and plucked him with main force, boat and all, into his bark, out of the sea. Whereupon, when he found himself in captivity, for very choler and distain he bit his tongue in twaine within his mouth.' This man afterwards died in England. The voyage was principally regarded at the time for diffusing a fallacious hope of finding gold in these regions. One of the sailors had accidentally picked up a stone 'much like to a sea coal in color,' and his wife, on his return, happening to throw a part of it into the fire, and afterwards to quench it with vinegar 'it glistened with a bright marquesset of gold.' This event soon spread in a credulous age. 'The gold-finers of London,' says Hakluyt, 'assayed the stone, and gave it as their judgment that it contained a large quantity of gold. This circumstance actually became the main encouragement to a second voyage, and Frobisher was 'especially directed by commission' to search for 'more of this gold ore,' rather 'than for any further discovery of the passage.' We need, therefore, only further observe, that after taking out 'gold-finers,' to search for ore, and lading their ships on this second voyage with 'almost 200 tons,' though at first the delusion of having found the all-needful and all-rewarding object of anxiety continued both amongst the crews and at home, upon trial it proved to be 'no better than black lead; and verified the proverb—that all is not gold that glisteneth.'

Flattered by these partial successes of her commander, queen Elizabeth gave the name of Meta Incognita to the newly-discovered regions, and ordered a third expedition to be prepared to colonise them. Fifteen ships were accordingly destined to the service, twelve of which were to

bring back cargoes of gold ore, and the three others to remain, with 100 men, who were to form the settlement for one whole year. Frobisher was made supreme naval and military commander, and received a gold chain from the queen on his appointment.

The fleet destined for this earliest project of colonising the western world sailed from Harwich on the 31st of May, 1578, passed Cape Clear on the 6th of June, and discovered the coast of West Friesland on the 20th of that month, which was now named West England. All was 'well' until they reached the mouth of Frobisher's Strait, when the Dennis, a vessel of 100 tons, which had on board a principal part of the house which was designed for the winter settlers, was crushed by an island of ice, and went to the bottom. To this disaster succeeded a violent storm, which dispersed the whole fleet, driving some of the vessels up into the strait, in which they were afterwards locked up by the ice, and others into the open sea. Fogs, mists, and irresistible currents now perplexed them, and threw the admiral's experience itself out of all calculation. The fleet, after parting with two more ships, re-assembled with great difficulty in the countess of Warwick's Sound, and determined, under all the circumstances, to make the best of its way homewards, and abandon for the present the thought of establishing a colony.

In 1578 we find a gentleman of considerable talents and connections, Sir Humphrey Gilbert, receiving a commission from the crown, to undertake western discoveries, and to possess lands unsettled by Christian princes or their subjects, provided that he took possession of them within six years from the discovery. In this year he is said to have undertaken a voyage to Newfoundland; but no details of it remain. In 1583 Elizabeth incorporated a younger brother of Sir Humphrey's, with himself, Adam Gilbert, and other associates into a company to be called The Colleagues of the Fellowship for *the Discoverie of the North-West Passage*; and Sir Humphrey set sail to take formal possession of Newfoundland, and the Northern coast of America. 'The Portugals,' it is observed in Hakluyt, 'having a notable trade of fishing,' at this period, 'on the Newfoundland banke, where there are sometimes more than a hundred sail of ships.'

Sir Humphrey's fleet, consisting of five ships, of from two to ten tons burden, sailed from Cawsand Bay on the 11th of June. Amongst his men were included divers 'minerall men and refiners,' smiths, carpenters, and artificers; and 'for the solace of our people, and allurement of the savages, we were provided with musicke in good varietie; not omitting the least toyes, as morrice-dancers, hobby-horses, and May-like conceits, to delight the savage people, whom we intended to winne by all faire means possible.' At the harbour of St. John's they were welcomed by several English traders and foreigners, who had already settled here, and in whose presence they took possession of the port, and 200 leagues every way, in the name of the queen of England. Sir Humphrey re-embarked to pursue his discoveries southward. His ship, the Delight, a wretched bark of ten tons, was ultimately wrecked on Sable Island; and he again set sail for England in the Squirrel frigate. After a variety of uninteresting adventures, he passed the Azores in a perilous condition, on the 9th of September, and was observed to be nearly overwhelmed in a great swell of the sea. He still, however, persevered in making for home; bravely observing, that 'he would not forsake his little company,' with whom he had 'passed so many storms and perils.' The last tidings that were heard of him speak of his being seated abaft of the binnacle, with a book in his hand, calling out, 'Courage, my lads! we are as near to heaven by sea as by land!' This gentleman was half-brother to Sir Walter Raleigh. The first charter of a British colony was granted to him and his companions.

Captain Davis, one of the most successful of our early navigators, was engaged in 1585 on a new expedition to the north; the merchants of the metropolis, being convinced 'of the *likelyhood of the discoverie of the north-west passage*;' and that the former commanders had only been diverted from the design by the pursuit of irrelevant objects. Two barks, one of eighty tons called the Sunshine, and another the Moonshine, of thirty-five tons, were placed under his command; the former manned with twenty-three persons, and the latter with nineteen. Touching on the coast of West Greenland this little fleet passed over to the north-east shore of the western continent, and saw land in lat. 64° 15′, the weather being temperate, and the sea clear of ice. It was a cluster of islands, 'among which were many faire sounds, and good roads for shipping.' The first in which they anchored they called Gilbert's Sound, and found the natives easily attracted by their music and friendly gesticulations. 'They are a very tractable people, void of craft or double-dealing,' says the narrator; 'and easie to be brought to any civilitie or good order.' Here they found plenty 'such oare as M. Frobisher brought from Meta Incognita;' but seem to have understood its value, or rather want of value, better than he. Standing to the north-west on the 1st of August, in six days they discovered land, and a clear shore, in lat. 66° 40′—'a very fair rode under a brave mount,' to which they gave the name of Mount Raleigh. The north foreland they called Deer's Cape, and the south Cape Walsingham. This latter is to be distinguished from the Cape Walsingham of Frobisher, which is the southernmost point of Hall or Hale Island, at the southern side of Cumberland Strait. The great bay between these headlands they called Exeter Sound. August 8th they returned to the south; and, coasting round Cape Walsingham, reached another southern extremity of the land, now called Cumberland Land, or Island, to which they gave the name of God's Mercy, 'as being the place of our first entrance for the discovery.' They now sailed west, keeping this land to the north, and found a fine open passage from twenty to thirty leagues in width, 'the water of the very color, nature, and quality of the main ocean, which gave us the greater hope of our passage.' About sixty leagues up this strait they met with another archipelago of islands; and the weather

becoming very foggy, and the wind constantly in the south-east, after six days of abortive efforts to proceed, they set sail for England.

In a second voyage this intrepid adventurer dispatched two of his ships off Cape Farewell, to proceed northward between Greenland and Iceland, in search of a passage; whilst he should further explore the promising outlets he had discovered between Cumberland Island and Frobisher's Archipelago. In long 70° W., and lat. 66° 33′, he found a clear coast, which was afterwards discovered to be that of a considerable island; and passing a group of islands, the weather being very hot, they were singularly enough troubled with a fly 'which is called muskyto, for they did sting very greevously.' They now found open sea in a western course of fifty leagues, and doubled a cape in lat. 66° 19′, which brought them down in part into Hudson's Bay. They coasted the western side of Labrador for some time; but on the 11th of September, the weather being stormy and unpropitious, they again left for England, having a 'perfect hope of the passage, finding a mighty great sea, passing between two lands west.' Davis, says in a letter to his friend at home, 'I have now experience of much of the north-west part of the world. I have brought the passage to that likelihood, as that I am assured it must bee in one of four places, or els not at all.' We seem destined to indulge 'the triumph of hope over experience' (as Dr. Johnson said on a different occasion) upon this subject.

A third voyage, undertaken in the year 1587, conducted our navigator to the highest point of northern latitude that had ever been reached, that of 72° 12′, on the west coast of Greenland, which they now called London Coast, and gave the name of Cape Saunderson to its most western promontory. The strait between this and the opposite shore of America seems from this circumstance to have taken Davis's name. In the rest of the voyage he passed through Cumberland Straits, round by a group of islands at the bottom, and came home through Lumley's Inlet, or Frobisher's Strait, without making any new discovery of consequence.

From the western coast of Mexico, the Spanish government sent several early expeditions, to discover the Strait of Anian. This celebrated strait, which glittered for several centuries before the eyes of adventurers, has involved geographers in much perplexity, and been considered even as wholly inexplicable. The late Mr. Murray was convinced that it originated in a very different quarter of the world from that to which navigators have been accustomed to refer it.. 'In the earliest maps,' he says, 'Anian is delineated as the most eastern country of Asia, and it occupies the position of Cachmehina, which has always, with the natives, borne the title of Anam. To understand how the separating Strait of Asia and America could be placed here, we must attend to the train of ideas which prevailed at that infant era of geographical knowledge. The American Islands, when first discovered, were still viewed as part of the East Indies, in search of which the voyage of Columbus was undertaken. Even after they were proved to belong to a great mass of continent, that continent was supposed to be attached to, and to form the eastern boundary of Asia. Under the influence of these impressions, it is easy to conceive how the early East India navigators, on coming to Anam or Cochin China, where the coast first decidedly changes from east and west to south and north, might imagine that they were now between the two continents, and would soon come to the division between them, which might be named by anticipation the Strait of Anian. In one of the maps in the king's library this strait is represented as running up across the whole breadth of the two continents. The progress of navigation proved that no such Strait existed here; but still the idea was rooted in the minds of geographers, and they transferred it farther and farther north, till they reached the frozen extremities of Asia. It is not probable, however, that this impression was founded even upon the most remote tradition of Behring's Straits. The derivation above given seems confirmed by the circumstance that the idea of the Strait of Anian was always combined, not with that of a bleak and wintry passage, but of a smiling and fertile region, and even of gold; which last association wonderfully heightened its empire over the imagination of mankind.'

The further efforts of the Spanish government to explore the north-west coast are concealed by that mysterious obscurity which it studiously throws over its proceedings. The only other remarkable early voyage is that professed to have been made by Juan de Fuca, by birth a Greek. The Spaniards deny all knowledge of him; but one Douglas, an Englishman, who met him accidentally at Venice, took down his narrative, to the following purport: that, after passing the 48° of latitude, he had entered the Strait of Anian, and having sailed for twenty days through a long and winding channel, and seen people on the shore covered with the skins of beasts, he had emerged into the North Sea, when, conceiving himself to have accomplished the object of his voyage, he returned. This narrative was accounted a fable, till Meares and Vancouver, in tracing the north-west coast of America, discovered Vancouver's Island, separated from the continent by a long and narrow channel, precisely similar to that through which Fuca described himself to have passed. The aspect of the country and natives, and the passage with the open sea, precisely corresponded. It became evident, therefore, that the old captain had merely committed an error of judgment when, in sailing through this channel, he supposed himself to be sailing between Asia and America.

We now find the Dutch entering the field of enterprise. In 1594 William Barentz made his first voyage easterly as far as Waygatz, then along the western coast of Nova Zembla to lat. 77° 25′. The following year he undertook a second voyage, but did not reach Nova Zembla till the 17th August, when 'the weather being misty, melancholie, and snowie, and the ice impassible,' they returned to the westward, and arrived at the Maes in the close of the year.

A third voyage of Barentz is more interesting. The ships, on this occasion, after sailing among

much ice, discovered, 9th June, Bear (since called Cherry) Island; and, proceeding northerly, were the first who arrived at Spitzbergen, along the western coast of which they had advanced, on the 19th, as high as 80° 11′, opposite what is now called Hakluyt's Headland. Returning to the southward, Barentz made for the coast of Nova Zembla; doubled the northern extremity; and then was compelled, by the ice and bad weather, to seek for refuge in a bay, which he called Ice Haven: here he passed a 'cold, comfortlesse, darke, and dreadful winter,' in about the seventy-sixth parallel. The ship was wholly wrecked, and the surviving part of the crew, fifteen in number, left this spot the following year in two open boats; and, after forty days of the greatest fatigue, famine, and cold, in which Barentz and two others died, they reached Kilduin in Lap-land, a distance of upwards of 1000 miles from the bay.

The Russia and Turkey Companies fitted out two vessels for voyages in these regions, in 1602 and 1606, under the respective commands of George Weymouth and John Knight: James Hall, a Danish commander, was also despatched hither four successive times by his government; but no discoveries worth recording were made by any of these expeditions. The honor of making the next advance in north-western geography belongs to Henry Hudson, the enterprising navigator who gave his name to the bay, or inland sea, in which Hudson's Strait terminates, and also made no fewer than four voyages after a passage to India by the Polar regions. In the last of them, on which he sailed from the Thames, 17th April, 1610, his vessel was fitted out at the private expense of Sir John Wilstenholm and Sir Dudley Digges, whose names he inscribed on two prominent points of his chart, at the north-west extremity of Labrador. After reaching these by a western course through Frobisher's Strait, the land winding southward, he found an open sea; and his journey now abruptly terminates, a mutiny having arisen in the crew, who thrust their commander, with his son and seven others, into an open boat, in which they are all supposed to have perished. It seems a feeble tribute, on the part of his country, to this noble seaman, to have transferred his name only to the scene of his murder, and to have suffered the circumstances of his death to have been passed over, as they were, with a very insufficient enquiry after the perpetrators of it. He was the first of these voyagers who observed the inclination or dip of the magnetic needle.

Sir Thomas Button was the first navigator who reached the eastern coast of America, on the west side of Hudson's Bay. This he accomplished in 1612, following Hudson's route to Cape Digges, and then steering directly west across the bay. On the 18th of August he entered Nelson's River, on which the principal factory of the Hudson's Bay Company has since been established, and here he secured his vessels until the following spring, finding plenty of game in the neighbourhood. Steering north in the spring of 1613 he reached Southampton Island in lat. 65°, and having then coasted the whole of the west side of the bay, returned home.

W. Baffin, an English adventurer in the same regions in 1616, has given name to another very important bay to the north of Davis's Strait. He coasted the whole north-eastern shore of America to a higher latitude than had ever before been reached; but, leaving very imperfect observations of the points of discovery which he made, and no one longitude, 'each succeeding geographer, as Mr. Barrow observes, 'has drawn Baffin's Bay on his chart as best accorded with his fancy. In his latitudes, however, Baffin was tolerably accurate for the age in which he lived; and the return of Captain Ross, from his expedition in this direction, has confirmed the whole of Baffin's general outline.

In 1631 Luke Fox entered Hudson's Bay by the usual route, and explored Sir Thomas Roe's Welcome, a strait between the eastern coast of America and Southampton Island. He made the important observation that a tide came down from the north, contrary to that general tide which came in by the straits. He traced also a considerable part of the channel on the eastern side of the great island of Southampton, which captain Parry has since called, after him, the Fox Channel. Fox sailed along a considerable part of its eastern coast; but, when he found this to fail him, he began to think 'he had made a scurvie voyage of it,' and called the point of land he finally reached 'Foxe's Farthest.'

Captain James, an adventurer fitted out the same year with Fox by the merchants' of Bristol, was overtaken by winter in the southern part of Hudson's Bay, where he endured a series of sufferings from cold, the narrative of which tended much to chill the public ardor for future discoveries.

Forts and factories now began to be erected on the western coast of Hudson's Bay, for the protection of the fur trade, of which the company of that name had obtained a grant from Charles I., and projects of discovery were abandoned for the more certain results of commerce. This company has been accused of a general unfriendliness to scientific projects, or a jealousy of discoveries that might interfere with their monopolies in these regions; and in the early part of their history these dispositions were but too evident. Latterly their conduct has been more liberal; but the geographical information with which they have favored the world, compared with their means and advantages for exploring some of the most interesting parts of North America, has been very small.

In 1719 one of their servants at Nelson's River having heard, in his intercourse with the Indians, of a rich copper-mine northward, which was situated on the banks of a navigable river or inlet, came to England to solicit the directors to fit out two vessels of discovery for the purpose of searching for it, and exploring the bay. Their charter was partly held on their making efforts 'to discover a new passage to the South Sea,' a stipulation of which Knight did not fail to remind them; independently of which it would appear that his 'troublesome zeal' would have obtained no assistance. He ultimately procured two vessels, which sailed from Gravesend in 1720, but never returned. Captain Scroggs, in

the Whalebone, now proceeded in search of Knight's expedition, and in lat. 62° saw and treated with the Indians. In 64° 56′ he discovered and named Whalebone Point, and saw many whales, but heard nothing of his predecessor.

In 1742 captain Middleton was despatched by the lords of the admiralty in a ship of war to coast the eastern shores of America in this direction. He ascended Hudson's Bay and Sir Thomas Roe's Welcome to 65° 12′, where he found a headland, north of Cape Dibbs, and beyond it 'a fair opening' or river from six to eight miles wide at the mouth. This is now called the Wager Inlet, or river, and presents on the north side a convenient cave or harbour, which he named Savage Sound. Middleton, after having ascertained, as he thought, that there was no opening at the bottom of this inlet, steered northward to Cape Hope, the most northerly point of America, and which he hailed with peculiar joy, conceiving it to be the north-east point of that continent. They, however, found land to the westward, and, the sea being blocked with ice in a bay (Repulse Bay) which opened eastward, they made sail for England.

Middleton reported on his return to England that every chance of discovering a passage in this direction was completely at an end. 'If there were such,' he said, 'it must be impassable for the ice; and, from the narrowness of any such outlet in 67° or 68° of latitude, it can be clear of ice only one week in the year, and many years, I apprehend, not clear at all.' He would be happy to give any assistance in his power, but 'hoped never to venture himself that way again.' He was now in fact openly accused by Mr. Dodds and others of having been bribed from his duty by the Hudson's Bay Company; a long dispute ensued with respect to this charge, which, however, was not established, though the reputation of Middleton suffered with both the government and the public.

Dodds contended that 'the demonstrations now of there being a passage are as strong as they well can without actually passing it. Another expedition therefore was undertaken by captain William Moor and captain Francis Smith, in the Dibbs galley of 186 tons, and California of 146 tons. It was fitted out by a subscription of £10,000 in £100 shares, in 1746; government offering a large reward for the discovery of the north-west passage. These vessels ultimately went exactly to the same point as Middleton reached, and returned. Mr. Ellis's Journal of the voyage has supplied the public with some interesting particulars of a winter passed in Hayes River, about two miles above Fort York. Here, having secured their vessels in a creek, the people first set to work to dig holes in the ground to bury their wine and beer, and build log huts for their temporary abode. Being comfortably hutted on the 1st of November, on the 2d of that month they could not keep their ink from freezing at the fire, and the cold increased to such a degree as to render it prudent to take all their seamen from the ships. Mr. E. describes the full and change of the moon as the periods of severest cold. At other times they could take occasional exercise out of doors, and procure plenty of rabbits and partridges. Sometimes the difference was so great between the air without and within their huts as to cause instantaneous fainting on entering them, and, if but a door or window was opened, the cold air would rush in with great fury, and convert the vapors of their little atmosphere into a shower of snow. 'If we touch iron,' says this gentleman, 'or any other smooth solid surface in the winter, our fingers are fast froze to it; if, in drinking a dram of brandy out of a glass, one's tongue or lips touch it, in pulling it away the skin is left upon it. An odd instance of this sort happened to one of our people who was carrying a bottle of spirits from the town to his hut; for, not having a cork to stop the bottle, he made use of his finger, which was soon froze fast, by which accident he lost a part of it to make a cure practicable.'

We have now to notice two rather important land expeditions.—The journeys of Mr. Hearne in 1769 and 1772, into the interior of the country west of Hudson's Bay, had for their chief object the discovery of a large river and copper mine which had been frequently mentioned by the Indians to the servants of the Hudson's Bay Company.

He started from Churchill Fort, on the 6th of November, 1769, and crossing the Seal River, explored a group of small lakes near Chesterfield inlet; westward of them he found a larger lake, to which he gave the name of Athapuscow (the Slave Lake of Mackenzie), in lat. 62° N. In his journey he reached a place called Congecathawhachaga, on the 1st of July, in lat. 68° 46′ N., and 118° 15′ W. long. On the 13th he found what is called the Copper Mine River, and on the 15th began his survey of it, at about forty miles from its estuary, which he traced to what he considered the shores of the North Arctic Ocean. It was encumbered all the way with flats and falls. His supposed arrival at a point of the Northern Ocean, which he states to have borne north-west by west, and of which he declares he had an extensive view, is the only remarkable circumstance of his various routes.

Mr. Mackenzie set out from Fort Ghepiwagen on the 13th of June, 1789, on a similar errand. He took a more western course than Mr. Hearne, some of whose Indians accompanied him, and performed two journeys, principally in canoes, on the interior rivers of this continent. He proceeded first on the Slave River to the Slave Lake, through which he entered the river that now bears his name, and after passing the countries of several distinct tribes of Indians, arrived at that of the Esquimaux, in lat. 67° 45′. Mackenzie's River here begins to widen considerably, or rather spread itself into a number of narrow channels, flowing around low islands. On the 10th of July it wore a face of solid ice, intermixed with veins of black earth. On the 12th, in lat. 69° 1′, he found a lake open to the west, in which, out of the channel of the river, there was not more than four feet of water. From a high part of one of the islands to the east he could discern a range of mountains in the south-west, extending northward beyond the ice. Yet

shortly after, in lat. 69° 14′, he assumes that he had reached the Arctic Ocean, or rather would appear to wish the reader to think so, while he avoids expressly asserting it. Here he saw a number of whales, which his guides assured him were the principal food of the Esquimaux, none of whom appeared, though vestiges of their habitations were seen. Mr. Mackenzie encamped on an island at the mouth of the river, which he called Whale Island, for two days, yet never tasted the water it appears, and leaves the principal point of his journey, like Mr. Hearne, most lamely drawn.

This gentleman, in a second journey on the Unjiga, or Peace River, in 1792, reached the Stony or Rocky Mountains, in a south-west direction, and, having with some difficulty transported his canoe across them, embarked on a branch of the Oregan, Colombia, or Great River of the west, which is here about 200 yards wide, and which he successfully pursued to one of the numerous inlets of the Pacific Ocean, in lat. 52° 20′. He afterwards travelled to the Pacific by land.

In the interim the honorable Daines Barrington had (in 1773) presented to the Royal Society a series of papers on the practicability of approaching the North Pole, and the president and council of that society made application to the Admiralty, to send out a ship or ships, to try how far navigation might be practicable in that quarter. The Racehorse and Carcass bombs were accordingly prepared, and the command given to captains Constantine Phipps and Lutwidge. Sailing from the Nore on the 10th of June, they passed along the western coast of Spitzbergen, and advanced to latitude 80° 48′, in sight of the Seven Islands; here they were beset in the ice on the 1st of August, and on the 10th, after being forced through it by a north-east wind, they proceeded to the southward, and arrived on the 25th of September at the Nore.

Captain Cook, it is well known, was employed in this direction on his last voyage, having under his command the Resolution and Discovery. Previous to the sailing of this expedition, an act was passed for granting the reward of £20,000 for the discovery of '*any* northern passage' by sea, between the Atlantic and Pacific Oceans, and the reward of £5000 to any ship which should approach the North Pole within a degree. Cook left England in July 1776; entered Behring's Strait the 9th of August, 1779; and on the 17th reached lat. 70° 41′ N., where he saw the highest point of America surrounded with ice; which he therefore named Icy Cape, in lat. 70° 29′, long. 198° 20′. The ice drifting down towards the ships, and the weather becoming foggy, he now stood to the southward; and, as the season was advanced, he determined to pass the winter at the Sandwich Islands, where he was killed, and the expedition returned home without accomplishing any further discovery in this direction.

We ought now to notice the successive Russian voyages along the northern coast of Asia. Between 1734 and 1738 lieutenants Moroviof, Malgyn, and Skurakof, succeeded in proceeding from Archangel to the Bay of Obe; and, in the last year, Offzin and Koskelef reached the mouth of the Yenisei, from that bay. In 1735 lieutenant Prontshistshef set out in the contrary direction from the Lena, but was stopped by Cape Cavero Vostochnoi, which is the single spot on this coast which has never been passed. From the Lena eastward to the Kowyma, the voyage has frequently been performed, and Shalauroff, in 1671, succeeded in reaching the Shelatskoi Noss, but could not double it; the only instance of its having been passed is that of Deshnef, who, as far back as the year 1648, penetrated to Anadyr, from the Kowyma, through Behring's Strait.

The only English Voyages to the Polar Regions, between that of Cook and those of the year 1818, were the unfortunate ones of Mr. Charles Duncan, a master of the navy, despatched by the Hudson's Bay Company, in 1790, to join a sloop of the name of Churchill, then in Hudson's Bay; he soon discovered that his crew were so utterly averse from the enterprise, and set up so formidable an opposition to his proceeding, that he deemed it prudent to return home. On this the governors fitted out a strong ship, the Beaver, with which Mr. Duncan commenced his second voyage, and wintered in Churchill River till the 15th of July, when he proceeded to Chesterfield Inlet; but here again his crew mutinied, encouraged by an officer second in command, and thus ended this attempt.

Before entering upon our late expeditions, we must notice further efforts of Russia in this direction. Since the general peace she has been prosecuting discoveries in every part of the globe. In the southern ocean her ships have penetrated as far as the seventieth parallel, and discovered, it is said, islands which had escaped the eye of captain Cook: they boast of having rounded the Santlwich land of that celebrated navigator; and of having ascertained that the Southern Shetland consists only of numerous groups of small islands. But more of this hereafter. They have sent land expeditions into the unknown regions of Tartary, behind Thibet, and into the interior of the north-western side of North America. Men of science have been commissioned to explore the northern boundaries of Siberia, and to determine points, on that extensive coast, hitherto of doubtful position. 'In February, 1821,' says the Quarterly Reviewer, 'Baron Wrangel, an officer of great merit, and of considerable science, left his head-quarters on the Nishney Kolyma, to settle, by astronomical observations, the position of Shalatzkoi-Noss, or the north-east cape of Asia, which he found to lie in lat. 70° 50′ N. considerably lower than it is usually placed on the maps. Having arranged this point, he undertook the hazardous enterprise of crossing the ice of the polar sea on sledges drawn by dogs, in search of the land said to have been discovered, in 1762, to the northward of the Kolyma. He travelled directly north, eighty miles, without perceiving any thing but a field of interminable ice, the surface of which had now become so broken and uneven as to prevent a further prosecution of his journey. He had gone far enough, however, to ascertain that no such land could ever have been discovered.'

Count Romanzoff, the able minister of the late emperor Alexander, had intended to equip an expedition to explore the north-west passage by Hudson's Bay or Davis's Strait: but, on finding that preparations were making in England to attempt it by that route, he determined on prosecuting the discovery from the eastward. For this purpose he caused a ship of 180 tons to be built of fir, at Abo, to which he gave the name of Rurick. Her establishment consisted of lieutenant Kotzebue, lieutenant Schischmareff, two mates, M. A. Von Chamisso, of Berlin, naturalists, Dr. Eschholz, surgeon, M. Choris, painter, and twenty men; and, to the credit of the commander, it may be mentioned that, after a navigation of three years in opposite climates, and in so small a vessel, he lost one man only, who left the Baltic in a consumption. The Rurick sailed from Plymouth in October 1815; and on the 28th of March had reached Easter Island. Some of the natives swam off to them with yams, taro roots, and bananas, which they gave in exchange for bits of iron hoop. As the boats approached the shore, they began to assemble in great numbers, and though unarmed, and apparently desirous of the strangers landing, they were thought to exhibit a hostile appearance; and the boats were repelled from the shore by volleys of stones. This conduct, so contrary to their former practice, was afterwards explained to lieutenant Kotzebue, at the Sandwich Islands, as arising from the conduct of an American, who kidnapped a party of the natives a short time before on board his schooner called the Nancy, from New London.

On the 16th of April lieutenant Kotzebue descried a small island, probably the Dog Island of Schouten, but which, differing twenty-two miles in latitude from that given by him, Kotzebue calls Doubtful Island: and on the 19th they discovered another small island, covered with majestic cocoa-nut trees, to which he gave the name of Romanzoff. It had no inhabitants; but boats and deserted huts were visible. This new discovery so delighted our navigator, that, inconsiderable as he felt it to be, 'I would not,' he says, 'have resigned the pure and heartfelt joy which it gave me for the treasures of the world.' On the 22d they fell in with another island, in 14° 41′ S., long. 144° 59′ 20″ W., which was also considered as a new discovery; the truth however is, that they all belong to those groups whose numbers are not yet ascertained, but which are known by the name of King George's and Palliser's Islands, discovered by Cook; to which also belong what he is pleased to call Rurick's Chain, and Krusenstern's Island.

On the 19th of May they crossed the line of Mulgrave's islands, in 8° 45′ 52″ N., and on the 21st discovered a group of low coral islands, lying in about 11° N., and long. 190°, and separated by a channel, which, considering it as a new discovery, they named Kutusoff and Suwaroff; but this 'new discovery' seems only to form a part of the group long known as Wallis's Islands.

On the 19th of June they reached Avatscha Bay, in Kamtschatka; on the 20th of July they descried Behring's Islands, and on the 27th were close in with St. Lawrence Island, where they had some communication with the natives, who resembled the people whom Cook found on the shores of Norton Sound, and the Aleutian Islands; and were living in tents made of the ribs of whale, covered with the skin of the morse. Their mode of salutation was like that of the Esquimaux of Baffin's Bay; 'each of them,' says Kotzebue, 'embraced me, rubbed his nose hard against mine, and ended his caresses by spitting on his hands, and wiping them several times over my face.'

On the 30th of July they were on the American shore, between Cape Prince of Wales and Garozdeff's Islands, which being found to consist of four instead of three, as laid down in Cook's chart, induced Kotzebue to conjecture that the fourth must have subsequently risen out of the sea, 'otherwise,' says he, 'Cook or Clarke would have seen it.' At all events, he looked on it as a new discovery, and named it after Ratmanoff, who had been Krusenstern's first lieutenant on his voyage to Japan. To the northward of Cape Prince of Wales is a long low island, covered with luxuriant verdure, and apparently well inhabited: but on landing they found only dogs in the houses, which had mud walls; the interior was cleanly and convenient, and divided into a number of apartments by boarded partitions; the floors, raised three feet from the ground, were also of wood, which is supplied by the vast quantity of drift brought by the north-east current from the mouths of the rivers of America to the southward of Behring's Straits, and thrown on the shores of the straits. Beyond this island was a deep inlet, running eastward into the continent. On entering this bay two boats were observed, of the same kind as those made use of in the Aleutian Islands. The appearance of the people in them was extremely filthy and disgusting, and their countenances had an expression of fierceness. To this bay, which was not examined, Kotzebue gave the name of his lieutenant, Schischmareff; to the island that of admiral Saritscheff.

Proceeding northerly they met with two light boats, the people in which were extremely savage, and, uttering the most piercing cries, threatened to hurl their lances: pointing muskets at them had no effect. The land continued low, and trended more to the eastward, when on the 1st of August the entrance into a broad inlet was discovered, into which the current ran rapidly. The interior of this great inlet is the undoubted discovery of Kotzebue.

'I cannot,' says he, 'describe the strange sensation which I now experienced, at the idea that I perhaps stood at the entrance of the so long sought north-east passage, and that fate had chosen me to be the discoverer. I felt my heart oppressed; and at the same time an impatience which would not let me rest, and was still increased by the perfect calm. To satisfy myself, at least, by going on shore, and clearly observing from some eminence the direction of the coast, I had two boats got ready, at which our naturalists were highly delighted. We set out by two o'clock in the afternoon; the depth regularly decreased: half a mile from shore we had still five

fathoms. We landed without difficulty near a hill, which I immediately ascended: from the summit I could nowhere perceive land in the strait; the high mountains to the north either formed islands or were a coast by themselves for that the two coasts could not be connected together was evident even from the great difference between this very low and that remarkably high land. From the eminence on which I stood I had a very extensive view into the country, which stretched out in a large plain, here and there interrupted by marshes, small lakes, and a river, which flowed, with numerous windings, and the mouth of which was not far from us. As far as the eye could reach every thing was green; here and there were flowers in blossom, and no snow was to be seen but on the tops of the mountains at a great distance: yet one had to dig but half a foot deep to find nothing but frost and ice under this verdant carpet. It was my intention to continue my survey of the coast in the boats; but a number of baydares coming to us, along the coast to the east, withheld me. Five of them, each with eight to ten men, all armed with lances and bows, soon landed near us. At the head of each boat was a fox skin, on a high pole, with which they beckoned to us, uttering at the same time the loudest cries. I ordered my crew to be prepared for defence; and went myself, with our gentlemen, to meet the Americans, who on seeing us approach sat down like Turks, in a large circle on the ground, by which they meant to manifest their friendly intentions: two chiefs had seated themselves apart from the rest. We entered this circle well armed, and perceived that they had left most of their arms in their boats, but had long knives concealed in their sleeves. Distrust, curiosity, and astonishment, were painted on their countenances; they spoke very much, but unfortunately we did not understand a word. To give them a proof of my friendly sentiments, I distributed tobacco; the two chiefs received a double portion; and they were all evidently delighted at this valuable present. Those who had received tobacco first were cunning enough secretly to change their places, in the hope of receiving a second portion. They prize tobacco highly, and are as fond of chewing as of smoking it. It was a curious sight to see this savage horde sitting in a circle, smoking out of white stone pipes, with wooden tubes. It is very remarkable that the use of tobacco should already have penetrated into these parts, which no European has ever visited. The Americans receive this, as well as other European goods, from the Tschukutskoi. To the two chiefs I gave knives and scissars; the latter, with which they seemed to to be quite unacquainted, gave them particular pleasure, when they remarked that they could cut their hair with them; and immediately they went from hand to hand round the whole circle, each trying their sharpness on his hair. It was probably the first time in their lives that these Americans had seen Europeans, and we reciprocally regarded each other. They are of a middle size, robust make, and healthy appearance; their motions are lively, and they seemed much inclined to sportiveness; their countenances, which have an expression of wantonness, but not of stupidity, are ugly and dirty, characterised by small eyes and very high cheek bones; they have holes on each side of the mouth, in which they wear morse-bones, ornamented with blue glass beads, which gives them a most frightful appearance. Their hair hangs down long, but is cut quite short on the crown of the head. Their head and ears are also adorned with beads. Their dresses, which are made of skins, are of the same cut as the Parka in Kamtschatka; only that there it reaches to the feet, and here hardly covers the knee; besides this they wear pantaloons and small half-boots of seal-skin.'

The latitude of the ship's anchorage was 66° 42′ 30″, long. 164° 12′ 50″, and here terminated her geographical discoveries. Nothing but sea was seen to the eastward, and a strong current ran to the north-east; from which circumstances our navigators still cherished a hope of discovering through this inlet a passage into the frozen ocean. With this view they spent thirteen days in examining the shores of this inlet; but the only passage out of it was on the south-eastern shore, apparently communicating with Norton Sound, and a channel on the western side opening probably into Schischmareff Bay.

On a promontory, which juts into the south-eastern part of the bay, the landing party made 'a singular discovery:'—'We had climbed much about during our stay, without discovering that we were on real ice bergs. The doctor, who had extended his excursions, found part of the bank broken down, and saw to his astonishment that the interior of the mountain consisted of pure ice. At this news we all went, provided with shovels and crows, to examine this phenomenon more closely; and soon arrived at a place where the back rises almost perpendicularly out of the sea, to the height of 100 feet; and then runs off, rising still higher. We saw masses of the purest ice of the height of 100 feet, which are under a cover of moss and grass; and could not have been produced but by some terrible revolution. The place which by some accident had fallen in, and is now exposed to the sun and air, melts away, and a good deal of water flows into the sea. An indisputable proof that what we saw was real ice is the quantity of mammoth's teeth and bones, which were exposed to view by the melting, and among which I myself found a very fine tooth. We could not assign any reason for a strong smell, like that of burnt horn, which we perceived in this place. The covering of these mountains, on which the most luxuriant grass grows to a certain height, is only half a foot thick, and consists of a mixture of clay, sand, and earth; below which the ice gradually melts away, the green cover sinks with it, and continues to grow; and thus it may be foreseen that, in a long series of years, the mountain will vanish, and a green valley be formed in its stead. By a good observation we found the latitude of the tongue of land 66° 15′ 36″ N.'

This result of 'a terrible revolution' is considered by M. Chamisso, the naturalist of the expedition, 'to be similar to the ground-ice, covered with vegetation, at the mouth of the Lena, out of which the mammoth, the skeleton of which is now in St. Petersburg, was thawed.' He makes the height of it to be 'eighty feet at

most;' and 'the length of the profile, in which the ice is exposed to sight, about a musket-shot.'

On quitting this inlet, to which was properly given the name of Kotzebue's Sound (on the 15th of August), with a fine open sea, without the least appearance of ice on the water, or snow on the land, and with the thermometer from 8° to 12° of Reaumur (50° to 59° of Fahrenheit), the Rurick stood directly across for the Asiatic coast, 'because,' says Kotzebue, 'I wished to become acquainted with its inhabitants, and to compare them with the Americans.' This comparison had long before been made, and was certainly no object of his voyage. Here were no discoveries to be made. He stood, however, over to East Cape, and, having passed the remainder of the month of August among the Tchukutskoi, made the best of his way to Oonalaska.

The recent expeditions to the North Polar Regions seem first to have been suggested by the remarkable fact of the breaking away of an immense body of ice from the eastern coast of Greenland. 'It had been observed in the summer months of the year 1815,' says the able writer in the Quarterly Review, who has so constantly kept this subject before the public, 'and more particularly in those of 1816 and 1817, by ships coming from the West Indies and America, as well as by those going out to Halifax and Newfoundland, that islands of ice, unusual in magnitude and number, occurred in the Atlantic, many of them as far down as the fortieth parallel of latitude. Some of these were detached ice-bergs, from 100 to 130 feet above the surface of the water, and several miles in circumference; others were flat islands of packed ice, presenting so vast an extent of surface that a ship from Boston is said to have been three days entangled in it, near the tail of the Great Bank of Newfoundland. The ship of the Unitas Fratrum, proceeding to the missions on Old Greenland, was, last year, eleven days beset, on the coast of Labrador, with the ice-bergs, many of which had huge rocks upon them, gravel, soil, and pieces of wood. The packet from Halifax passed, in April last, a mountain of ice nearly 200 feet in height, and at least two miles in circumference. By accounts from Newfoundland, Halifax, and other northern ports of America, it would appear that greater quantities of ice were seen in the months of May, June, and July, than had ever been witnessed by the oldest navigators; and that the whole island of Newfoundland was so completely environed with it that the vessels employed in the fishery were unable to get out to sea to follow their usual occupations. The source from which these enormous masses proceeded could not long be concealed. It was well known to the Greenland fishermen that from Staatenhoek, the southern promontory of Old Greenland, an uninterrupted barrier of ice stretched north-easterly, or parallel nearly to the coast, approaching frequently to the very shores of Iceland; and that the small island situated in lat. 71° 11′, long. 5° 30′ W., called Jan Mayen's island (a sort of land-mark which those engaged in the seal fishery always endeavour to make), had of late years been completely enveloped in ice; and that from this point it generally took a more easterly direction, till it became fixed to the shores of Spitzbergen, from 76° to 80° of latitude. The most central parts of this immense area of ice, which occupy the mid-channel between Greenland and Spitzbergen, separate from time to time into large patches, and change their position according to winds and tides; but the general direction in which they move with the current is from north-east to south-west, or directly towards that part of Old Greenland where the Danish colonies were supposed to be established, and which are immediately opposite to Iceland. Here it would seem those masses became a kind of fixed nucleus, round which a succession of floating fields of ice attached themselves, till the accumulated barrier, probably by its own weight and magnitude, and the action of the impeded current, at length burst its fetters, and has been carried away to the southward.'

Mr. Scoresby, junior, an able navigator of the Greenland seas, had actually observed at this period 2000 square leagues (18,000 square miles) of those seas included between the parallels 70° and 80° to be perfectly void of ice, which had disappeared within the last two years.

On the whole the hopes of the country, as to the success of an expedition in search of a north-west passage, were fully revived when an active and spirited administration announced its determination to patronize the attempt. Two distinct expeditions were now therefore prepared; one, which was intended to proceed by the North Pole, as the nearest and probably the most practicable route, to Behring's Strait; the other, to attempt a passage by the openings leading west out of Baffin's Bay. To the expedition destined for the Polar passage were assigned the Dorothea, of 370 tons, commanded by captain David Buchan, and the Trent of 250 tons, by lieutenant John Franklin. To that for the North-west passage, properly so called, the Isabella of 382 tons, commanded by captain John Ross, and the Alexander of 252 tons, by lieutenant William Edward Parry. The results were not flattering. The Polar expedition returned without making a single discovery, through the Dorothea having become disabled by the ice; the other examined Baffin's Bay, so far as to ascertain that the narrative of that navigator is substantially true; and that the chart appended to the Voyage of the North-West Fox is, in fact, the chart of Baffin, and very correct. Captain Ross, therefore, seems to have done nothing more than confirm the vague account of Baffin's voyage in Purchas's Pilgrim, leaving Sir T. Smith's Sound, Alderman James's Sound, and Lancaster Sound, unexplored with regard to the possibility of their leading to a passage.

As a warning indeed to future exploratores we should add that captain Ross was completely mistaken in regard to the last of these supposed inlets; and that he could *not* see at the distance of about eight leagues 'the land round the bottom of the bay, forming a connected chain of mountains with those which extended along the north and south sides.' Captain Sabine disputed the correctness of his conclusion at the time;—but captain Parry was destined afterwards to conduct a new expedition through a noble chan-

nel of ninety miles uninterrupted length, in this direction.

The vessels selected for the new expedition were the Hecla and the Griper. The Hecla was of 375 tons burden, and, having been built as a bomb-vessel in 1815, was well adapted for stowage. She was commanded by lieutenant W. E. Parry, and had on board a ship's company of fifty-eight persons. The Griper, formerly a twelve gun brig of 180 tons, was much smaller than the Hecla; and, though her accommodations were inferior, yet she neither sailed so well as the other ship, nor was she able to carry her own supply of provisions; she was commanded by lieutenant Matthew Liddon, and had a ship's company of thirty-six persons. Both of these vessels had the whole of their outside, from the keel to some height above the water-line, covered with an extra lining of oak plank, from three to four inches thick, and a number of beams and additional timbers were put into the holds, in order to resist the pressure of approaching floes of ice. Their bows were also defended from the impulse of floating masses by strong plates of iron. Standing bed-places were substituted in place of cots; and planks, tarpaulins, and Russian mats, were provided for housing the ships during winter. The ballast consisted of seventy chaldrons of coals in the Hecla, and thirty-four in the Griper. The men were also furnished by government with a suit of warm clothes and a wolfskin blanket. In order to preserve the health of the ship's crew a large quantity of Messrs Donkins and Gamble's preserved meats and soups was supplied;—antiscorbutics of different kinds were provided, and articles of utility and ornament were carried out to secure the friendship of the Indians or Esquimaux, or to purchase any supplies which the expedition might require.

Thus equipped, and supplied with scientific instruments of every kind, the expedition set sail from Deptford on the 4th May 1819. It passed the Orkney Islands on the 20th, and on the 15th June it descried Cape Farewell, at the great distance of forty leagues. On the 3d July it crossed the Arctic Circle, and advanced among the ice on the west coast of Greenland, as high nearly as 73° of latitude, without being able to observe a single opening. Unwilling to proceed to the north of Lancaster Sound, captain Parry resolved to force his way through this apparently interminable barrier, and after six days of laborious warping through the ice, in which much skill and courage were displayed, he succeeded on the 28th in bringing the vessels into an open sea, and, in three days more, a favorable breeze carried him across Baffin's Bay, and enabled him to land at Possession Bay, for the purpose of making magnetic observations. Mr. Fisher, with two men, was directed to proceed up a stream which flows through the valley, and which is about thirty-five or forty yards wide at its mouth, for the purpose of observing the nature and productions of the country; and he here witnessed 'human tracks in so perfect a state, that had the place been known to be frequented by man,' says Mr. F., 'we should have supposed that people had been here only a few days before; but one of the men who were with me, as well as myself, remembered that we had been on the very same spot where the tracks were observed last year, gathering plants, so that we had not the smallest doubt of their being the remains of our own footsteps made last year; for, had any Esquimaux been at this place since we were here before, it is more than probable that they would have taken away the pole on the hill; for from what we saw of them nothing could be a greater prize for them than a piece of wood of the size of that in question.'

On the 2d of August the expedition was directly opposite Lancaster Sound. On the 3d they had fairly entered it, and, under the influence of a favorable breeze, they had, before the 4th, completely crossed the *mountainous barrier*, which, in a deceitful state of the atmosphere, had appeared to captain Ross to shut up this sound. The decision of this long agitated question created, as might have been expected, much interest on board, and did not fail to excite those hopes of future success which a different result would have in a great measure extinguished. 'It is more easy to imagine than to describe the almost breathless anxiety,' says captain Parry, 'which was now visible in every countenance, while, as the breeze increased to a fresh gale, we ran quickly up the sound. The mast-heads were crowded by the officers and men during the whole afternoon; and an unconcerned observer, if any could have been unconcerned on such an occasion, would have been amused by the eagerness with which the various reports from the crow's-nest were received, all however hitherto favorable to our most sanguine hopes.'—p. 31. The land which they passed on the 4th August, namely, from Brooking Cuming's Inlet to Cape Fellfoot, differed from any that had been previously seen. It appeared like an immense wall in ruins, rising almost perpendicularly from the sea to the height of about 500 feet. The surface of the precipice consisted of horizontal strata, some of which projected farther out than the rest, detaining the debris of the superincumbent rocks, and forming a succession of taluses of different inclinations. The precipices thus assumed a variety of shapes and sizes, and the whole of this bold coast had a very interesting appearance. On the 5th August, when they had nearly reached Prince Leopold's Isles, their progress to the west was completely checked by a compact body of ice, which it was impossible to penetrate. They had, therefore, no choice but to wait for the dissolution of this immense barrier, or to follow the open sea to the southward. They adopted this last alternative, and bent their course into the Prince Regent's Inlet. Here they encountered vast numbers both of the white and black whales, and also several sea-unicorns or narwhals.

The white or Beluga whale, the average length of which was from eighteen to twenty feet, astonished the sailors with a species of music which received the name of the whale song. 'Whilst we were pursuing them to-day,' says Mr. Fisher, 'I noticed a circumstance that appeared to me rather extraordinary at the time, and which I have not indeed been able to account for yet to my satisfaction. The thing alluded to is a sort of whistling noise that these fish made when

under the surface of the water; it was very audible, and the only sound which I could compare it to is that produced by passing a wet finger round the edge or rim of a glass tumbler.'

In advancing to the south, along the eastern side of Prince Regent's Inlet, they observed that the rise and fall of the tide was about twelve or fourteen feet, and the ebb was observed to set to the southward and westward, which led them to conclude that the flood came in that direction, and not through Lancaster Sound. Another compact barrier of ice, extending obliquely from the west land to the south-east land, again arrested their progress, and they were reduced to the alternative of either waiting for an opening in it, or shaping their course to the north, in order to avail themselves of any favorable changes that might have taken place in the barrier near Prince Leopold's Isles. The last of these plans was thought the most advisable, and they accordingly turned to the north. On the 9th of August, to the south of Port Bowen, they saw vast numbers of the common black whales. One of these fish, which they caught on the 11th, was about thirteen feet five inches long, and had a horn four feet two inches in length, while the greatest circumference of its body was nine feet. On the 12th the narwhals were seen swimming about at all hours of the day in shoals. On the 16th a current was observed whose direction was N. N. W., and which moved at the rate of a quarter of a mile per hour; and, on the 20th, they passed Cape Fellfoot, where the horizontal strata resemble two parallel tiers of batteries, placed at regular intervals from the top to the bottom of the cliff, affording a grand and imposing appearance. On the same day they passed Maxwell Bay, a very noble one, with several islands, and many openings in its northern shore; and on the 22d, leaving Beechey Island to the north, they crossed Wellington Channel, in long. 93° W., which was as open and navigable to the utmost extent of their view, as any part of the Atlantic, and which captain Parry would have explored, had the ice obstructed his progress to the westward. The rapidity, however, of the run from Beechy Island to Cape Hotham held out better prospects, though they were of short duration. A body of ice was seen to the westward, but, a narrow neck of it appearing to consist of loose pieces, the Hecla was pushed in, and, after a quarter of an hour's boring, forced her way through it, followed by the Griper. On the 23d they passed to the south of Griffith's Island; on the 24th, to the south of Lowther Island, and between Young and Davy Islands (called Snow Isles in our chart); on the 25th they passed Garret Island; and on the 26th, 27th, and 28th, Allison's Inlet, Cape Cockburn, and across Graham Moore's Bay. On the 28th they landed on Byam Martin Island, in lat. 75° 9′, and long. 103° 50′, for the purpose of making magnetical observations, and the results which they obtained were of a very unexpected nature. They found that the variation of the needle was now 168° easterly, or 192° westerly, having passed 180°, so that they had actually crossed the line of no variation, or rather the line of 180° of variation to the north of the magnetic pole. The last observations which they made were on the 22d, in long. 91° 55′, and lat. 74° 20′, so that the magnetic pole must be placed somewhere between 91° 55′, and 103° 50′ of W. long., not far from the 102d degree.

This island, estimated to be about ten miles long, consisted of white sandstone, and exhibited a more luxuriant vegetation than any of those which they had lately seen. 'We saw,' says Mr. Fisher, 'no animals of any kind on this island; but we found evident proofs of its having been frequented, not only by different species of the brute creation, but that it had also, at some period or other, been inhabited by man; for, at the distance of about a quarter of a mile from the shore, we found the ruins of six huts close together on the side of a hill. They had been all nearly of the same size, that is, about twelve feet long, and from eight to twelve feet broad, besides a space of about three feet square, formed by four flags set upon their edge at the end of each hut. I understand from those who have been often among the Esquimaux huts in Greenland, that they have always a small apartment of this sort at one end of their hut, in which they keep all their provisions. Whether the cloven tracks we saw were chiefly those of musk-oxen or rein-deer, it is impossible to say; but, if we were to judge from the number of deer's horns we saw, we should be inclined to consider them as being principally those of the latter animal. It would appear that bears also frequent this land occasionally: we found two or three of their skulls, and their tracks were very numerous along the beach.'—Fisher's Journal.

On the 30th of August a favorable breeze permitted the expedition to advance to the westward among the ice, round the south end of Byam Martin's Island. On the 1st of September they came in sight of Melville Island. On the 2d a party landed upon it; and on the 4th, at seven o'clock in the evening, they crossed the meridian of 110°, and thus accomplished the first portion of the discovery of the North West Passage which the British government had considered worthy of a reward. After prayers, on the 5th, all hands were called on deck, when Mr. Parry told the ship's company, in an official manner, that they had last night passed the meridian of 110° W. of Greenwich, and by that means became entitled to the reward of £5000, promised by parliament to the first ship that reached that longitude beyond the Arctic Circle. He took also this opportunity of informing them how highly satisfied he was with their past conduct. 'I think it may be considered a remarkable instance in our voyage,' says Mr. Fisher at this point, 'that the first anchor we let go since we left England was in 110° W. long.'

The expedition continued to advance westward from the 6th to the 18th of September, a little beyond Cape Providence, experiencing considerable difficulties from the heaviness of the drifting ice, which appeared to be coming from high latitudes. It was now packed close in with the land; the ships were regularly beset in the bay ice on the morning of the 18th, and, as the severity of the season was rapidly increasing, captain Parry had no other alternative, but

either to return to some secure harbour to the eastward, or to remain fixed during the winter, upon an exposed coast, without a bay or a headland to afford him the smallest shelter. He therefore availed himself of a fine breeze, and returned to Winter Harbour on the 24th, after experiencing very serious obstructions from the driving floes, one of which forced the Griper aground.

Winter Harbour is partly guarded from the violence of the sea by a reef of rocks at the mouth over which there is in some places scarcely a fathom of water, and between that reef and the land there is a bar, with only three fathoms and a half in some places. The harbour itself being about three miles long, it was thought proper that the ships should be stationed about half a mile from the top of it; but, the whole being completely frozen over, it was necessary to cut a canal for their passage through the solid ice.

This operation was performed by first marking out parallel lines, distant from each other a little more than the breadth of the larger ship. Along each of these lines a cut was then made with an ice-saw, and others again at right angles to them, at intervals of from ten to twenty feet; thus dividing the ice into a number of rectangular pieces, which it was again necessary to subdivide diagonally, in order to give room for their being floated out of the canal. 'To facilitate the latter part of the process, the seamen, who are always fond,' says captain Parry, 'of doing things in their own way, took advantage of a fresh northerly breeze, by setting some boats' sails upon the piece of ice, a contrivance which saved both time and labor. 'This part of the operation, however, was by far the most troublesome, principally on account of the quantity of young ice which formed in the canal, and especially about the entrance. At half past seven P. M., we weighed our anchors, and began to warp up the canal, but the northerly wind blew so fresh, and the people were so much fatigued, having been almost constantly at work for nineteen hours, that it was midnight before we reached the termination of our first day's labor. I directed half a pound of fresh meat per man to be issued as an extra allowance, and this was continued daily till the completion of our present undertaking. All hands were again set to work on the morning of the 25th, when it was proposed to sink the pieces of ice as they were cut under the floe, instead of floating them out, the latter mode having now become impracticable, on account of the lower part of the canal through which the ships had passed being hard frozen during the night. To effect this it was necessary for a certain number of men to stand upon one end of the piece of ice which it was intended to sink, while other parties, hauling at the same time upon ropes attached to the opposite end, dragged the block under that part of the floe on which the people stood. The officers of both ships took the lead in this employ, several of them standing up to their knees in water frequently during the day, with the thermometer generally at 12°, and never higher than 16. At 6 P. M. we began to move the ships. The Griper was made fast astern, and the Hecla and the two ships' companies being divided on each bank of the canal, with ropes from the Hecla's gangways, soon drew the ships along to the end of our second day's work. I should on every account have been glad to make this a day of rest to the officers and men; but the rapidity with which the ice increased in thickness, in proportion as the general temperature of the atmosphere diminished, would have rendered a day's delay of serious importance. I ordered the work, therefore, to be continued at the usual time in the morning, and such was the spirited and cheerful manner in which this order was complied with, as well as the skill which had now been acquired in the art of sawing and sinking the ice, that, although the thermometer was at 6° in the morning, and rose no higher than 9° during the day, we had completed the canal at noon, having effected more in four hours than in either of the two preceding days. The whole length of this canal was 4082 yards, or nearly two miles and one-third, and the average thickness of the ice was seven inches. At half past one P. M. we began to track the ships along in the same manner as before, and at a quarter past three we reached our winter quarters, and hailed the event with three loud and hearty cheers from both ships' companies.'—Captain Parry's Journal, p. 27.

The whole of the masts were now dismantled except the lower ones;—the boats, yards, masts, and rigging, were deposited in a shade erected for them on shore; and a housing raised over deck, as the covering of their winter's habitation. The sun had not entirely deserted the parallel of Winter Harbour. He still shot a few uncertain beams from the southern horizon; but even these were withdrawn on the 4th of November, and our voyagers were left in their dreary exile, with the certainty of losing the light of the sun for nearly three months, and of having only the twilight of an Arctic winter to guide them in their pursuits and amusements.

The arrangements made by captain Parry, to provide occupations for the winter, were of the most judicious description. He ordered the crew to be mustered in divisions at nine o'clock in the morning, and six o'clock in the evening of every day, in order to see that they were all clean and sober, and to afford an opportunity of examining the state of their bed-places. He established a weekly newspaper, called the North Georgia Gazette and Winter Chronicle, and every fortnight the crew were amused with plays, acted by the officers, some of which were written for the occasion, with the view of inspiring a zeal and ardor for accomplishing the objects of the expedition. Frequent hunting parties were arranged, for the double purpose of amusement, and of supplying the crew with fresh provisions; and every thing was done to beguile the tedium of the winter, by keeping both the minds and bodies of the crew in a state of constant occupation and excitement. The following is captain Parry's description of the dreariness of external nature in these regions :—.

'The officers were in the habit of occupying near two hours in the middle of the day in rambling on shore, even in our darkest period, except when a fresh wind and a heavy snow-drift confined them within the housing of the ships.

It may be well imagined that at this period there was but little to be met with in our walks on shore, which could either amuse or interest us. The necessity of not exceeding the limited distance of one or two miles, lest a snow-drift, which often rises very suddenly, should prevent our return, added considerably to the dull and tedious monotony which day after day presented itself. To the southward was the sea, covered with one unbroken surface of ice, uniform in its dazzling whiteness, except that in some parts a few hummocks were seen thrown up somewhat above the general level. Nor did the land offer much greater variety, being almost entirely covered with snow, except here and there a brown patch of bare ground in some exposed situations, where the wind had not allowed the snow to remain. When viewed from the summit of the neighbouring hills, on one of those calm and clear days which not unfrequently occurred during the winter, the scene was such as to induce contemplation, which had perhaps more of melancholy than of any other feeling. Not an object was seen on which the eye could long rest with pleasure, unless when directed to the spot where the ships lay, and where our little colony was planted. The smoke which there issued from the several fires, affording a certain indication of the presence of man, gave a partial cheerfulness to this part of the prospect; and the sound of voices, which, during the cold weather, could be heard at a much greater distance than usual, served now and then to break the silence which reigned around us,—a silence far different from that peaceable composure which characterises the landscape of a cultivated country; it was the deathlike stillness of the most dreary desolation, and the total absence of animated existence. Such indeed was the want of objects to afford relief to the eye or amusement to the mind, that a stone of more than usual size appearing above the snow, in the direction in which we were going, immediately became a mark on which our eyes were unconsciously fixed, and towards which we mechanically advanced. Dreary as such a scene must necessarily be, it could not, however, be said to be wholly wanting in interest, especially when associated in the mind with the peculiarity of our situation, the object which had brought us hither, and the hopes which the least sanguine among us sometimes entertained of spending a part of our next winter in the more genial climate of the South Sea Islands. Perhaps, too, though none of us then ventured to confess it, our thoughts would sometimes involuntarily wander homewards, and institute a comparison between the rugged face of nature in this desolate region, and the livelier aspect of the happy land which we had left behind us.'—Parry's Journal, p. 124.

It is remarkable that the mean temperature of the four summer months, at Melville Island, is exactly the same as the mean temperature of the year formerly assigned to the North Pole itself! The greatest cold experienced by captain Parry was quite tolerable in calm weather, and we believe that less inconvenience was experienced from it by the party than has often been felt in Canada and Siberia. 'One of the crew of the Griper, who had lost his way in a hunting excursion, returned with one of his hands much frost-bitten. It was at first as hard as a piece of marble, but, by successful treatment, it recovered so far, that he lost only a part of each of the four fingers of his left hand. Another sailor, who had his hands frost-bitten, came on board in such a state, that when his hands were immersed in a tub of cold water, for the purpose of being thawed, the cold communicated to the water created a film of ice on its surface. The skin and nails came off some of the fingers, and the rest were amputated. One of the most remarkable effects, however, of severe cold, was its influence on the mental as well as the corporeal faculties. On the 5th of October, two of the gentlemen of the expedition, who had exposed themselves to severe frost in the ardor of pursuing a wounded stag, were sent for by captain Parry. Upon arriving in his cabin, 'They looked wild, spoke thick and indistinctly, and it was impossible to draw from them a rational answer to any of our questions. After being on board for a short time, the mental faculties appeared gradually to return with the returning circulation; and it was not till then that a looker-on could easily persuade himself that they had not been drinking too freely. To those who have been much accustomed to cold countries, this will be no new remark; but I cannot help thinking that many a man may have been punished for intoxication, who was only suffering from the benumbing effects of frost; for I have more than once seen our people in a state so exactly resembling that of the most stupid intoxication, that I should certainly have charged them with that offence, had I not been quite sure that no possible means were afforded them on Melville Island to procure any thing stronger than snow-water.'—Captain Parry's Journal, p. 108, 109.

The only other affliction which arose from the weather was what is called snow-blindness. It began by a sensation like that which is felt when sand or dust gets into the eyes. A solution of sugar of lead removed the complaint in two or three days, and the recurrence of the disease was prevented by the use of a piece of crape. The scurvy appeared in the months of March and April, but the invalids all recovered, in consequence of captain Parry's having been at much pains to raise some mustard and cress for them in his own cabin.

The reappearance of the sun on the 3d of February was, after an absence of ninety-two days, joyfully welcomed. The weather gradually improved. The shooting excursions were resumed; and, in order to break the monotony of the spring, an expedition was projected across Melville Island.

This expedition, consisting of captain Parry, captain Sabine, Mr. Fisher, and others, amounting in all to thirteen, set off on the 1st of June. 'Shortly after we started,' says Mr. Fisher, 'we came to a small lake, about half a mile in length, and 200 yards in breadth; a considerable part of it was clear of ice, which led us to suppose that two eider ducks, that flew past us a little while before we came to it, had come from it. Soon after we passed this lake we saw several ptarmi-

gans; and, in the course of the night, shot seven of them as we went along. Between two and three o'clock in the morning we got to the north-west end of a range of hills, which terminate the view to the north from Winter Harbour. From the top of these hills we could see the ships' masts very plainly with the naked eye, the distance being, as nearly as we could judge, ten or eleven miles. From these hills also we had a very extensive view of an immense plain, extending to the north and west of us. It was completely covered with snow, and so level that, had we not been convinced that it was considerably higher than Winter Harbour, we should be apt to suppose that it was the sea; but, as this objection could not be started against its being a large lake, some were of opinion that it was so; on approaching the border of it, however, we were soon satisfied that it was only a level plain. Our route, from the time of our leaving the ships, until we came in sight of this plain, was over ground, generally speaking, pretty even, but gradually ascending. Its surface, for most part of the way, was at least more than two-thirds covered with snow. Soon after we got to the confines of the plain, above mentioned, we saw a rein-deer and a fawn coming across it from the southward. The fawn appeared to be very young, and rather of a darker color than the doe. The latter did not differ in this respect from those that we killed in the beginning of last winter.'—Fisher's Journal, p. 199.

The party arrived at the sea at Point Nias, in lat. 75° 34′, on the 7th of June. From this they passed over to Bushnan's Cove on Liddon's Gulf, which they reached on the 11th. On the 12th they went to Hooper's Island, and returned in safety to Winter Harbour on the 15th, after a journey of 180 miles. The most remarkable event in this tour was the discovery of the remains of six Esquimaux huts, about 300 yards from the beach of Liddon's Gulf. These huts, situated in lat. 75° 2′ 37″, and W. long. 111° 37′ 17″, were exactly the same as those formerly described.

The state of the ice on the 1st of August permitted the expedition to leave Winter Harbour, and every thing seemed to predict a successful voyage west. These expectations, however, were soon disappointed. The situation of the ships among the masses of driving ice was often precarious, and, when they reached Cape Dundas, at the west end of Melville Island, on the 16th, the ice from the north compelled them to abandon all hopes of prosecuting their voyage, after obtaining a glimpse of three capes to the south, which they called Banks' Land. Captain Parry resolved therefore to advance, if possible, to the south; but, after waiting in vain for an opening in the ice, he renounced this plan also, and on the 30th August notified his intention of returning to England. No events of any great interest marked the return of the expedition, excepting a communication with the Esquimaux, who inhabit an inlet called the River Clyde, on the western shores of Baffin's Bay.

The Hecla arrived in Leith Roads on the 3d November, after an absence of eighteen months; and captain Parry had the high satisfaction of seeing every officer and man on board both ships (with only one exception, out of ninety-four persons) return to their native country in as robust health as when they left it.

The greatest heat at Melville Island was	+ 60° Fahr.	on the 17th of July.
The greatest cold at ditto . . was	— 50	on the 15th of February.
Mean temp. of warmest month, July	+ 42·41	
——— of coldest month, February	— 32·19	
——— of winter, Dec. Jan. Feb.	— 28·02	
of spring, March, April, May	— 3·27	
——— of summer, June, July, Aug.	— 37·11	
——— of autumn, Sept. Oct. Nov.	— 0·51	
The mean temperature for twelve months	+ 1·33	

If we substitute the mean temperature of August 1819, in place of August 1820, it will scarcely affect the mean results.

	Inches.	
The greatest height of the barometer was	30·86	on the 26th of April.
The lowest state of ditto .	29·00	on the 6th of March.

These results indicate a very extraordinary degree of cold. According to the table given by Mr. Leslie, after Mayer and Kirwan, the temperature of Melville Island *should have been* nearly 36°, whereas it is only 1⅓°, a result which throws into the shade all those speculations respecting the climate of the Arctic regions with which the public have been misled.

Captain Parry made various observations on the difference of temperature between the sunshine and the shade. The following are those which he has published:—

		Shade.	Sun.	Diff.
1820, March 19th. Mean Temp. — 13°·75.	9h A. M.	— 24°	+ 24°	48°
	10	— 23	+ 27	50
	11	— 22	+ 28½	50½
	12 Noon,	— 21	+ 29	50
	3 P. M	— 13	+ 19	32
March 25th. Mean Temp. — 26°·71.	1 P. M.	— 22	+ 17	37
	2	— 22	+ 25	47
	3	— 22	+ 21	43

	Time	Shade.	Sun.	Diff.
April 26th. Mean Temp. — 1°·17.	1h 30′ P. M.	+ 17	+ 6·5	10·5
	2	+ 22	+ 7	15
	2 18	+ 24·5	+ 7·6	16·9
	2 50	+ 21	+ 6·7	14·3
	6	+ 9·5	+ 4·5	5·0
April 27th. Mean Temp. + 0·08.	11h 20 A. M.	+ 15	+ 5	10
	11 30	+ 20	+ 7	13
	11 40	+ 34	+ 9	25
	11 55	+ 24	+ 8·5	15·5
	0 25 P.M.	+ 21	+ 7	14
	1	+ 20	+ 7·5	
	2 20	+ 25	+ 7·7	
	2 45	+ 10	+ 4·5	

The principal meteorological phenomena seen during the progress of the expedition were auroræ boreales, paraselenæ and halos. Out of many which occur, we select the following as short and pleasing :—'In the month of February, at half-past ten P. M., on the 19th, the aurora borealis was seen,' as described by lieutenant Beechey, 'in bright coruscations, shooting principally from the south by west quarter across the zenith to N. N. E., and partially in every part of the heavens. The light, when most vivid, was of a pale yellow, at other times white, excepting to the southward, in which direction a dull red tinge was now and then perceptible. The coruscations had a tremulous waving motion, and most of them were crooked towards the E. N. E. The fresh gale which blew at the time from the N. N. E. appeared to have no effect on the aurora, which, as before observed, streamed directly to windward, and this with great velocity. The brighter part of this meteor dimmed whatever stars it passed over, even those of the first magnitude and those of the second and third magnitude, so much as to render them scarcely visible.' (p. 147). 'The whole of the phenomenon disappeared in about three-quarters of an hour.'

'With our present temperature, the breath of a person, at a little distance, looked exactly like the smoke of a musket just fired, and that of a party of men employed upon the ice to-day resembled a thick white cloud.'

Experiments with the pendulum.—A full detail of these experiments was published in the Philosophical Transactions. Captain Sabine has given the following brief statement of the results, which are as follows :—

From the acceleration between	Diminution of gravity from the Pole to the Equator.	Ellipticity of the earth.
London and Brassay . .	.0055066	$\frac{1}{314.3}$
London and Hare Island .	·0055139	$\frac{1}{313.8}$
Brassay and Hare Island .	·0055082	$\frac{1}{314.5}$
London and Melville Island	·0055258	$\frac{1}{312.8}$

Captain Parry was surprised at the great distance at which sounds were heard in the open air, during the continuance of intense cold ; and, notwithstanding the frequency with which they had occasion to remark it, it always afforded them surprise. 'We have, for instance,' says he, 'often heard people distinctly conversing, in a common tone of voice, at the distance of a mile; and to-day I heard a man singing to himself as he walked along the beach, at even a greater distance than this.'

From the experiments made at Winter Harbour to determine the variation in the magnetic force, it appears that the time of vibration of Mr. Brown's dipping-needle decreased between London and Winter Harbour in the ratio of 481 to 446 ; and consequently the force in the direction of the dipping-needle appeared to have increased in the ratio of 1·168 to 1. From the increase in the times of vibration of three horizontal needles, between Sheerness and Winter Harbour, the force acting upon them appeared to have diminished in the ratio of 12·93 to 1 ; 13·23 to 1 ; and 13·83 to 1 ; the mean of which is 13·33 to 1.

We have thus detailed at length the proceedings of this first expedition of captain Parry, because, in point of fact, it accomplished far more for geographical science than any of the subsequent ones ; and will therefore be an ample specimen of the rest.

In his second expedition he was directed to keep close to the coast of America, or to attempt to find his way to Behring's Straits by Hudson's Bay. Middleton's facts had by no means disproved the possibility of finding an outlet here ; and their weight was diminished by the cloud which hung over his testimony. It was determined, then, to revive on this side the often repeated attempt. All the measures taken in former voyages for strengthening the ships, and storing them with ample supplies, were repeated, with such improvements as experience had suggested ; and, in the spring of 1821, the new expedition, composed of the Fury, under captain Parry, and the Hecla, under captain Lyon, was ready to start. On the 8th of May it set sail from the Nore ; but, being detained by adverse winds, it was not till the 14th of June that they reached Davis's Straits, and saw there the first iceberg. They were soon in Hudson's Straits, where mountains of ice were still tossing, and allowed only a perilous passage. They considered themselves even fortunate in being inserted into a corner of one of these masses, and being for a week driven about along with it. August,

therefore, was begun before they reached that point on the eastern coast of Southampton Island whence Baffin had turned back, and where their career of discovery was to begin.

After great deliberation they determined to attempt the much controverted 'Frozen Strait' of Middleton; and, in fact, though some days were spent in exploring a wide bay, to which they gave the name of the duke of York, this strait was found to exist, and to bring them into Repulse Bay. It too soon, however, proved to be completely land-locked, and the whole coast to correspond with the description of Middleton. More than a month had been lost in going over his ground; and it was now their task to explore the coast beyond, leaving not an opening untried, by which it was possible that an entrance into the Polar Sea could exist. The coast held the unpromising direction of from west to east; and presented a complete chaos of straits, bays, islands, and passages, blocked up with ice of every form and dimension. After exploring therefore a number of inlets, to the principal of which was given the name of captain Lyon, the thickening symptoms of polar winter obliged them to saw a passage into the heart of a field of ice attached to an island, called by them Winter Island, and to lay themselves up for the season.

The tedious hours of this long winter were beguiled by dramatic entertainments, musical parties, and particularly by intercourse with a tribe of Esquimaux, who came to settle in their vicinity. From the conversation, and even the rude delineations of the latter important notices were derived respecting the shores beyond. It was stated that the coast, which had hitherto run eastward, would now take a northerly direction; that it belonged to a great peninsula, forming the north-east extremity of America, and on the western side of which was a vast extent of ocean. The peninsula was bounded on the north by a strait leading into that ocean; and on the other side was a large tract of insular land, called Keiyuk Tarruoke; north of which, again, was another strait, similarly opening into the western sea. All this proved substantially correct. Having employed the best half of June in sawing through 2000 feet of environing ice, they set sail on the 3rd of July, and about the middle of the month saw before them the great northern insular tract, which they chose to call Cockburn Island; and, on the left, the strait which they fondly hoped was to lead them into the great ocean. On attempting, however, to enter this passage, it was found, to their deep disappointment, closed by a continued and impenetrable barrier of ice. In the course of the summer they worked their way forward ten or twelve miles, thus placing themselves within the strait, but never could reach farther; and the whole extent of the bay and of the sea appeared covered with ice piled upon ice, in immoveable masses. All their subsequent information was gained by land-expeditions, which enabled them to delineate the strait, its islands, and its opening into the Polar Sea; but all their endeavours to penetrate across the great masses of continent were baffled by rocks, ravines, lakes, and inundations, occasioned by the thaw. To the great tract of land on whose eastern coast they sailed they gave the name of Melville Peninsula.

On the commencement of the third summer, as their stores and supplies were drawing to a close, captain Parry formed the too daring design of taking those of the Hecla into his own ship, sending home captain Lyon, and prosecuting the voyage alone. Happily this hazardous scheme was frustrated by the appearance of very formidable symptoms of scurvy, which left no choice but that the whole should hasten homewards. Such were the results of the second expedition of this intrepid navigator.

The admiralty, now determining to act upon every probable point of communication, commissioned captain Lyon to proceed from Repulse Bay to the mouth of Hearne's River; captain Franklin by an overland journey from Mackenzie's River to Behring's Straits; and Dr. Richardson to accompany captain Franklin to the first point, and then to trace the way back to Hearne's River. Captain Lyon was forced back to England by stress of weather, and the badness of his vessel, after he had found Sir Thomas Roe's Welcome much narrower than laid down in the charts, and full of shoals; but he saw no ice in it. Southampton Island he found broader than it was thought to be, or consisting, perhaps, of several islands. Corrections were also made by him in the positions of some of the capes in Hudson's Straits. Captain Lyon's Narrative, in small octavo, with plates, is an interesting work.

Captain Franklin and Dr. Richardson (after a series of exertions and hardships, for the particulars of which we must refer to their respective publications), had in a former journey completely settled the geography of the mouth of the Copper Mine River, and between 500 and 600 miles to the eastward of it. The latitude of this river, which Hearne originally stated to be upwards of 72° N., but which was afterwards reduced to 69°, is now determined to be 67° 48′ N., and long. 115° 30′ W., which is five degrees more westerly than is usually laid down in the charts. One part of the coast, to the eastward of Hearne's River, was found to come down as low as the Arctic circle, or 66° 30′ N. Little or no ice was floating on the sea, which was deep and unobstructed, on which ships of any burden might freely navigate. Captain Franklin had every reason to believe that when once an expedition reached this part of the coast of North America it would find no difficulty in making good the passage west. He found that the general current set to the eastward, as all the driftwood was found on the western sides of the promontories. Nearly parallel to the coast, and at the distance of five or six miles from it, a range of numerous islands extended along the whole coast he at this time traversed.

The one now projected, therefore, was the second, and by far the more important journey of captain Franklin over land—with a view to explore the mouth of Mackenzie's River, and to travel thence by sea to the north-west extremity of America.

It was planned at the close of 1823, and Dr. Richardson offered as before to become the companion and auxiliary of captain Franklin, taking

for his specific object the survey of the coast eastward from Mackenzie to Copper Mine River. As we have noticed the equipments of some other of our northern expeditions, we may here insert a brief description of those of captain Franklin's:—1. He superintended at home the building of three mahogany boats, having timbers of ash, both ends alike, and fitted to be steered either with a sweep oar or a rudder. The largest was twenty-six feet long, five feet four inches broad, and adapted for six rowers, a steersman, and officer; it could be carried on the shoulders of six men, and was capable of carrying three tons weight beside the crew. The two others were each twenty-four feet long, and four feet ten inches broad, adapted for five men, a steersman, and officer. These were particularly designed for the navigation of the rivers of North-West America, and the ascent and descent of the rapids. 2. Colonel Pasley, of the Royal Engineers, suggested in addition, an admirable little vessel called the Walnut Shell, nine feet only in length, four feet four inches broad, framed of ash, and fastened with thongs, the whole being covered with a prepared canvas, and shaped exactly like one valve of a walnut shell. It weighed only eighty-five lbs., and could be taken into five or six portable pieces, and put together again in twenty minutes. Scientific instruments of the most accurate and portable kind were of course among the most important articles of outfit; together with the newly invented *pemmican* or prepared meat of the metropolis, which captain Franklin calls 'the principal article of provision.'

The officers embarked from Liverpool on the 16th of February, 1825, and passed through the state of New York to Upper Canada and Fort William, on the northern shore of Lake Superior. This point they reached on the 10th of May: and now proceeded by Rainy Lake, the Lake of the Woods, Lake Winipeg, and the Saskatchawan River to Cumberland House, where they arrived on the 15th of June. Their course was now by Pine Island, Beaver and the English River, Deep River, and Clear and Buffalo Lakes, where they overtook the boats of the expedition on the 29th of June.

In the instructions of captain Franklin he was told to expect to find his majesty's ship, Blossom, under the command of captain Beechey, in the rendezvous of Kotzebue's Inlet, in the summer of 1826.

We cannot do justice to the able and valuable information of captain Franklin's published Narrative of his Second Expedition, now before us. It must here suffice to say that he so far accomplished its objects as to reach the coast of North America, and lay down the bearing of Fort Norman, at the mouth of Mackenzie's River (in July, 1826), as in W. long. 124° 44′ 47″, N. lat. 64° 40′ 38″; variation 39° 57′ 52″ E. Here the eastern detachment parted company with captain Franklin, and completed a survey of the coast between what they have called Point Separation and the Copper Mine River, the result of which is seen in our map North Polar Regions.

Captain Franklin pursued his western track along the coast, as also seen in our map, to Return Reef, about half way between Mackenzie's River and Icy Cape, having been detained about a week by fogs. This circumstance, the advanced state of the season, and his uncertainty as to the actual point to which captain Beechey might have arrived, induced him here to pause—he could not calculate on accomplishing the rest of his proposed journey in less than a month, and if this calculation were interfered with by any unforeseen accident the safety of his crew he felt might be compromised. The utmost point west he reached was in lat. 70° 24′ N., and long. 149° 37′ W.

A party in the barge of the Blossom had at that period reached beyond the inlet of Kotzebue to within about 160 miles of the Return Reef, or ultimate point of Franklin. Captain Beechey's narrative we believe has not yet (May 1828) been given to the public.

Captain Parry's third expedition, in 1824-5, took the direction of Barrow's Strait and Prince Regent's Inlet, but the ice in Baffin's Bay retarded him so long that he did not reach Port Bowen, on the eastern shore of the inlet, until all further navigation was for the year precluded. Here, therefore, his first winter was passed pretty nearly in the same manner as former winters in the polar seas, while the ships were shut up in 'thrilling regions of thick-ribbed ice.' Perhaps, indeed, this third winter was somewhat more dreary than former ones; there was a total absence of all human creatures besides themselves, and almost of every object of animated nature. 'In other respects,' as captain Parry observes, 'a description of the aspect of nature would suit alike each winter they had passed in the ice.' Their comforts and conveniences, however, were considerably improved this voyage, and with these the general health of the seamen. This circumstance captain Parry mainly attributes to his being able to keep up a uniform and moderate temperature throughout every part of the ships, varying only from 56° to 63°, with a perfectly dry atmosphere, by means of Silvester's 'warming apparatus,'—'a contrivance,' he says, 'of which I scarcely know how to express my admiration in adequate terms.'

Neither the occupation of the seamen, nor the occasional diversion of their minds, were objects likely to be neglected by our navigator. Instead of their former recreations, which might now be supposed to have lost the charm of novelty, captain Hoppner (of the Fury), suggested and planned a masquerade, in which both officers and men should be able to take a share. 'It is impossible that any idea could have proved more happy, or more exactly suited to our situation. Admirably dressed characters of various descriptions readily took their parts, and many of these were supported with a degree of spirit and genuine humor which would not have disgraced a more refined assembly; while the latter might not have disdained, and would not have been disgraced by, copying the good order, decorum, and inoffensive cheerfulness which our humble masquerades presented. It does especial credit to the dispositions and good sense of our men, that, though all the offi-

cers entered fully into the spirit of these amusements, which took place once a month, alternately on board each ship, no instance occurred of any thing that could interfere with the regular discipline, or at all weaken the respect of the men towards their superiors. Ours were masquerades without licentiousness—carnivals without excess.' —Parry's Journal, pp. 49, 50. An occupation not less assiduously pursued, and of much more important and permanent benefit to those engaged in it, was the re-establishment of schools.

A great number of important observations on the magnetic influence were conducted by lieutenant Foster, which have appeared in the Philosophical Transactions of the Royal Society. In treating of Professor Barlow's plate for correcting the effect of local attraction, and the severe trial it had to undergo in latitudes where the compasses had before been rendered wholly useless, captain Parry says, 'never had an invention a more complete and satisfactory triumph; for to the last moment of our operations at sea did the compass indicate the true magnetic direction.' 'Such an invention,' he adds, 'as this, so sound in principle, so easy of application, and so universally beneficial in practice, needs no testimony of mine to establish its merits; but, when I consider the many anxious days and sleepless nights which the uselessness of the compass in these seas has formerly occasioned me, I really should esteem it a kind of personal ingratitude to Mr. Barlow, as well as great injustice to so memorable a discovery, not to have stated my opinion of its merits, under circumstances so well calculated to put them to a satisfactory trial.'—pp. 55, 56.

On the 20th of July the disruption of the ice first allowed the ships to remove from their winter quarters, and enabled them to stretch across towards the western shore of Prince Regent's Inlet, where, after some slight obstruction, they succeeded in making progress along the land. This, however, did not continue long; the ice was perceived to approach the land, till at length it reached the ships and drove them both on shore, and the Fury was found to be so very seriously damaged as to make it impossible for her to proceed farther without repairs. It was now therefore necessary to form a sort of basin by means of the ice; the process was tedious and laborious, and various impediments occurred from the movement and pressure of the ice. They succeeded, however, after immense exertions, in heaving the Fury down; but this had scarcely been accomplished when a gale of wind destroyed the securities of the basin, which rendered it necessary to tow her out, to re-equip the Hecla, and for the latter to stand out to sea. The Fury was once more driven on shore, and it now appeared on a close examination, that it was perfectly hopeless, circumstanced as they were, to make her sea-worthy; that it was absolutely necessary to abandon her. 'The officers and men,' says captain Parry, 'were now literally so harassed and fatigued as to be scarcely capable of further exertion without some rest; and on this, and one or two other occasions, I noticed more than a single instance of stupor amounting to a certain degree of failure in intellect, rendering the individual so affected quite unable at first to comprehend the meaning of an order, though still as willing as ever to obey it. Captain Parry afterwards says:—'With a twelvemonth's provisions for both ships' companies, it would have been folly to hope for final success, considering the small progress we had already made, the uncertain nature of the navigation, and the advanced period of the present season. . . . . . I was therefore reduced to the only remaining conclusion, that it was my duty, under all the circumstances of the case, to return to England, in compliance with the plain tenor of my instructions.'

This, therefore, was the least successful of all the brave and skilful efforts of captain Parry.

We can but very briefly advert to his late attempts to 'reach the Pole.'

The object of this expedition was to reach the North Pole by means of two sledge-boats, so constructed as either to travel over the ice, or sail or row through spaces of open water. The Hecla was again appointed to carry him and his companions to Spitzbergen, and there to wait in harbour for his return. The vessel left the Nore on the 4th of April, reached Hammerfest on the 18th, and on the 27th, having received on board a number of rein-deer, made sail to the northward. On the 14th of May the Hecla was abreast of Hakluyt's Headland, when she was obliged to run into the main-ice for security in a heavy gale of wind. She remained beset and drifting about with the ice, chiefly to the eastward, for four-and-twenty days, when, on the 8th of June, she was liberated. During this detention the weather was delightful: 'I never remember,' says captain Parry, 'to have experienced in these regions such a continuance of beautiful weather as we now had, during more than three weeks that we had been on the northern coast of Spitzbergen.' Twice he thought of here leaving the Hecla, and taking to the boats, but her safety, in such a sea, thus left with fewer than half her working hands, could not be reckoned upon for an hour; besides, he could not have known when or where to meet with her on his return. 'The nature of the ice,' he tells us, 'was beyond all comparison the most unfavorable for our purpose that I ever remember to have seen. The men compared it to a stone-mason's yard, which, except that the stones (masses) were of ten times the usual dimensions, it, indeed, very much resembled.'

On reaching the Seven Islands they were found to be all shut in by land-ice; but the party deposited on Walden Island a store of provisions for their return. Captain Parry then stood on to the northward among loose and broken ice, in search of the main body, as far as 81° 5′ 32″; but, not finding any thing like a field of ice, he stood back to the southward, and on the 19th of June discovered a bay on the north coast of Spitzbergen, in which the Hecla was anchored in lat. 79° 55′ N., long. 16° 54′ E. It is named in the Dutch charts Treurenberg Bay.

Captain Parry on the 21st of June set out on his perilous undertaking, with two boats named the Enterprize and Endeavour; Mr. Beverly, the surgeon, being attached to his own:—

'Our plan of travelling,' he says, 'being nearly the same throughout this excursion, after we first entered upon the ice, I may at once give some account of our usual mode of proceeding. It was my intention to travel wholly at night, and to rest by day, there being, of course, constant daylight in these regions during the summer season. The advantages of this plan, which was occasionally deranged by circumstances, consisted, first, in our avoiding the intense and oppressive glare from the snow during the time of the sun's greatest altitude, so as to prevent, in some degree, the painful inflammation in the eyes, called 'snow-blindness,' which is common in all snowy countries. We also thus enjoyed greater warmth during the hours of rest, and had a better chance of drying our clothes; besides which, no small advantage was derived from the snow being harder at night for travelling. The only disadvantage of this plan was, that the fogs were somewhat more frequent and more thick by night than by day, though even in this respect there was less difference than might have been supposed, the temperature during the twenty-four hours undergoing but little variation. This travelling by night and sleeping by day so completely inverted the natural order of things, that it was difficult to persuade ourselves of the reality. Even the officers and myself, who were all furnished with pocket chronometers, could not always bear in mind at what part of the twenty-four hours we had arrived; and there were several of the men who declared, and I believe truly, that they never knew night from day during the whole excursion.

'When we rose in the evening, we commenced our day by prayers, after which we took off our fur sleeping-dresses, and put on those for travelling; the former being made of camlet, lined with racoon-skin, and the latter of strong blue box-cloth. We made a point of always putting on the same stockings and boots for travelling in, whether they had dried during the day or not; and I believe it was only in five or six instances, at the most, that they were not either still wet or hard frozen. This indeed was of no consequence, beyond the discomfort of first putting them on in this state, as they were sure to be thoroughly wet in a quarter of an hour after commencing our journey; while, on the otner hand, it was of vital importance to keep dry things for sleeping in. Being 'rigged' for travelling, we breakfasted upon warm cocoa and biscuit, and after stowing the things in the boats and on the sledges, so as to secure them, as much as possible, from wet, we set off on our day's journey, and usually travelled from five to five and a half hours, then stopped an hour to dine, and again travelled four, five, or even six hours, according to circumstances. After this we halted for the night, as we called it, though it was usually early in the morning, selecting the largest surface of ice we happened to be near, for hauling the boats on, in order to avoid the danger of its breaking up by coming in contact with other masses, and also to prevent drift as much as possible. The boats were placed close alongside each other, with their sterns to the wind, the snow or wet cleared out of them, and the sails, supported by the bamboo masts and three paddles, placed over them as awnings, an entrance being left at the bow. Every man then immediately put on dry stockings and fur boots, after which we set about the necessary repairs of boats, sledges, or clothes; and, after serving the provisions for the succeeding day, we went to supper. Most of the officers and men then smoked their pipes, which served to dry the boats and awnings very much, and usually raised the temperature of our lodgings 10° or 15°. This part of the twenty-four hours was often a time, and the only one, of real enjoyment to us; the men told their stories, and 'fought all their battles o'er again,' and the labors of the day, unsuccessful as they too often were, were forgotten. A regular watch was set, during our resting-time, to look out for bears, or for the ice breaking up round us, as well as to attend to the drying of the clothes, each man alternately taking this duty for one hour. We then concluded our day with prayers, and, having put on our fur dresses, lay down to sleep with a degree of comfort which perhaps few persons would imagine possible under such circumstances; our chief inconvenience being that we were somewhat pinched for room, and therefore obliged to stow rather closer than was quite agreeable. The temperature, while we slept, was usually from 36° to 45°, according to the state of the external atmosphere; but on one or two occasions, in calm and warm weather, it rose as high as 60° to 66°, obliging us to throw off a part of our fur-dress. After we had slept seven hours, the man appointed to boil the cocoa roused us, when it was ready, by the sound of a bugle, when we commenced our day in the manner before described.

'Our allowance of provisions for each man per day was as follows:—

Biscuit	. .	10 ounces.
Pemmican	. .	9 do.
Sweetened cocoa powder	. .	1 do. to make one pint.
Rum	. .	1 gill.
Tobacco	. .	3 ounces per week.

Our fuel consisted entirely of spirits of wine, of which two pints formed our daily allowance, the cocoa being cooked in an iron boiler over a shallow iron lamp, with seven wicks; a simple apparatus, which answered our purpose remarkably well. We usually found one pint of the spirits of wine sufficient for preparing our breakfast, that is, for heating twenty-eight pints of water, though it always commenced from the temperature of 32°. If the weather was calm and fair, this quantity of fuel brought it to the boiling point in about an hour and a quarter; but more generally the wicks began to go out before it had reached 200°. This, however, made a very comfortable meal to persons situated as we were. Such, with very little variation, was our regular routine during the whole of this excursion.'—P. 55—59.

On the 20th of July captain Parry says:—'We halted at seven A.M., having, by our reckoning, accomplished six miles and a half in a N.N.W. direction, the distance traversed being

ten miles and an half. It may, therefore, be imagined how great was our mortification in finding that our latitude, by observation at noon, was only 82° 36′ 52″, being less than five miles to the northward of our place at noon on the 17th, since which time we had certainly travelled twelve in that direction.'—P. 94. This circumstance was carefully concealed from the men; and on the 22d they had the satisfaction of observing that the ice had certainly improved; though the floes had not extended their surfaces so as to entitle them to be called 'fields.'

'In proportion, then, to the hopes we had begun to entertain, was our disappointment in finding, at noon, that we were in lat. 82° 43′ 5″, or not quite four miles to the northward of yesterday's observation, instead of the ten or eleven which we had travelled! However, we determined to continue to the last our utmost exertions, though we could never once encourage the men by assuring them of our making good progress, and, setting out at seven in the evening, soon found that our hope of having permanently reached better ice was not to be realised; for the floe on which we slept was so full of hummocks that it occupied us just six hours to cross it, the distance in a straight line not exceeding two miles and a half.'—P. 98, 99.

This laborious work was disheartening enough to the officers, who knew to what little effect they had been struggling, which, however, the men did not, 'though,' says Parry, 'they often laughingly remarked that 'we were a long time getting to this 83°!' At last it became—we may say it had for some time become—hopeless to pursue the journey.

'For the last few days, the eighty-third parallel was the limit to which we had ventured to extend our hopes; but even this expectation had become considerably weakened since the setting in of the last northerly wind, which continued to drive us to the southward, during the necessary hours of rest, nearly as much as we could gain by eleven or twelve hours of daily labor. Had our success been at all proportionate to our exertions, it was my full intention to have proceeded a few days beyond the middle of the period for which we were provided, trusting to the resources we expected to find at Table Island. But this was so far from being the case that I could not but consider it as incurring useless fatigue to the officers and men, and unnecessary wear and tear for the boats, to persevere any longer in the attempt. I determined, therefore, on giving the people one entire day's rest, which they very much needed, and time to wash and mend their clothes, while the officers were occupied in making all the observations which might be interesting in this latitude; and then to set out on our return on the following day. Having communicated my intentions to the people, who were all much disappointed in finding how little their labors had effected, we set about our respective occupations, and were much favored by a remarkably fine day.'—P. 102—104.

The highest point of latitude that was reached captain Parry considers to be 82° 45′, on the meridian of 19° 25′ east of Greenwich.

South Polar Regions.—From the period of captain Cook's voyages, the South Polar Ocean has been little regarded as a point of interest in geography, and in no considerable degree explored. He penetrated beyond the Antarctic circle, in long. 39° 30′ E., advancing to lat. 67° 30′, and met with fields and detached pieces of ice, in long. 101° and 110° W., between which he proceeded to lat. 71° 10′ S., the nearest approach made by him towards the South Pole, fields and mountains of ice being here scattered over the surface of the sea; and in long. 136° and 148° W., between which he descended to lat. 68°.

Captain Cook discovered no land in these regions beyond Sandwich land in lat. 60°. But the Russians, in a recent voyage of discovery, are said to have fallen in with several islands about the seventieth parallel; they also circumnavigated the Sandwich Land, which was left undetermined by Cook, and conjectured that it might be a part of a great southern continent.

The only detailed account of discoveries in this region which we have to add is from a paper of some length in the Edinburgh Philosophical Journal, relative to the discovery of what has been called New South Shetland. This is said to have been first seen, at least in modern times, by Mr. William Smith, master of the brig Williams of Blythe, trading from Buenos Ayres to Valparaiso. Fancying that the passage round Cape Horn might be weathered better by preserving a more than usual southerly course, and being on the 19th of February, 1819, in lat. 62° 40′ S., and long. 60° W., he imagined he saw land at the distance of two leagues. Next day (February 20th), he stood in for his supposed land; at noon his lat. by observation was 62° 17′ S., long. 60° 12′ W., by an excellent chronometer; the weather was moderate and the atmosphere clear. So fine was it, that he could not mistake the appearance. Fearing the return of blowing weather, he was deterred from approaching nearer, and being principal owner of the brig he was unwilling to endanger his policy of insurance, in case of meeting with any accident. He observed, however, to the westward more land, which he approached to the distance of ten miles; this, as well as the former, appearing to be an island, and the coast bare and rocky: he observed great abundance of whales and seals. On his arrival at Valparaiso, he related every thing that he had seen to the English there, who at first ridiculed the account: but he had a second opportunity of visiting this spot, in October 1819. He now discovered the same land, bearing south-east by east, three leagues. The weather was hazy; he bore up for it, and approached within four miles, when he proved it to be an island, or rather a large barren rock, inhabited only by innumerable penguins; he sounded, and in forty fathoms found a bottom of fine black sand; he hauled in till it bore east by south; having sounded when in sixty fathoms, he procured the same bottom. During the night he hauled off for security to the northward, but at day-light next morning he again stood in for the island; he could now distinguish it perfectly at the distance of three leagues; he

sounded in ninety-five fathoms and brought up fine sand and ooze. At 8 A. M., the weather being very clear, he could plainly distinguish the mainland, bearing S. S. E., the island being distant from it about three leagues. The mainland presented itself as a cape, to which the coast tended in a north-east direction, he stood in, and ran along the land as far as the point to which he gave the name of North Foreland, obtaining all the way regular soundings of sand and gravel, lessening gradually from thirty-five to twenty fathoms. He now hauled in for the cape, and proceeded, within three leagues, more easterly; the island now bearing north-west, distance seven leagues, and, observing the appearance of a good harbour, he sent a boat's crew and his first mate on shore, where they planted a board with the Union-jack, and an appropriate inscription, with three cheers, taking possession in the name of the king of Great Britain. To the mainland was given at first the name of New South Britain; but as that title, it was suggested, might lead to confusion with other places, Mr. Smith changed its name to New South Shetland, on account of its lying in about the same latitude as the Shetland Islands. He afterwards ascertained the existence and situation of the land for the length of 150 miles in a W. S.W. direction.

Mr. Smith having transmitted his observations to the British commanding officer in the Pacific, captain Shireff of the Andromache, who was at that time in Santiago, this officer forthwith chartered the brig Williams on government account, in order to make an accurate and regular survey of the coasts and harbours. Captain Basil Hall, F. R. S., was afterwards sent out, for the purpose of exploring and surveying this new region, which offers so many commercial advantages to Great Britain.

Polarity, the quality of a thing considered as having poles, or a tendency to turn itself into one certain posture; but chiefly used in speaking of the magnet. See Magnetism.

POLARISATION of Light. If a ray of light fall upon one of the surfaces of a rhomboid of Iceland crystal, and is transmitted through the opposite surface, it is separated into two pencils, one of which proceeds in the direction of the incident ray, while the other forms with it an acute angle of between 6° and 7°. The first of these pencils is said to experience the usual or ordinary refraction, and the other the unusual or extraordinary refraction. If the luminous object from which the ray proceeds be looked at through the crystal, two images will be distinctly seen, even when the rhomboid is turned round the axis of vision. If another rhomboid of Iceland spar be placed behind the first, in a similar position, the pencil refracted in the ordinary way by the first will be so also by the second; and the same thing holds with the extraordinary refracted pencil, none of the pencils being separated into two, as before. But if the second rhomboid be slowly turned round, while the first remains stationary, each of the pencils begins to be separated into two; and, when the eighth part of a revolution is completed, the whole of each of the pencils is divided into two portions. When the fourth part of a revolution is completed, the pencil, refracted in the ordinary way by the first crystal, will be refracted in the extraordinary way only by the second; and the pencil, refracted in the extraordinary way by the first, will be refracted in the ordinary way only by the second; so that the four pencils will be again reduced to two. At the end of three-eighths, five-eighths, and seven-eighths, of a revolution, the same phenomena will be exhibited as at the end of one-eighth of a revolution. At the end of four-eighths and six-eighths of a revolution, the same phenomena will be seen as at the first position of the crystals, and at the end of two-eighths of a revolution. If we look at a luminous object through the two rhomboids, we shall at the commencement of the revolution see only two images, viz. one of the least and one of the greatest refracted images. At the end of one-eighth of a revolution four images will be seen; and so on. It is obvious that the light which forms these images has suffered some new modification, or acquired some new property, which prevented it, in particular parts of a revolution, from penetrating the second rhomboid. This property has been called polarisation; and light is said to be polarised by passing through a rhomboid of calcareous spar, or any other doubly refracted crystals. See Optics, sect. 186—285.

Polarisation of Sound. The following curious facts, which are considered to prove the polarisation of sound, are given by Mr. Wheatstone, in the Annals of Philosophy, No. xxxii. p. 87:—'I connected,' says he, 'a tuning fork with one extremity of a straight conducting rod, the other end of which communicated with a sounding-board; on causing the tuning-fork to sound, the vibrations were powerfully transmitted, but, in gradually bending the rod, the sound progressively decreased, and was scarcely perceptible when the angle was a right one. As the angle was made more acute, the phenomena were produced in an inverted order; the intensity gradually increased as it had before diminished, and, when the two parts were nearly parallel, it became as powerful as in the rectilineal transmission. By multiplying the right angles in a rod, the transmission of the vibration may be completely stopped.'

In these experiments, the axis of the oscillations of the tuning-fork should be perpendicular to the plane of the moveable angles; for, if they are parallel, they will still be transmitted. Mr. Wheatstone gives the following explanation to prove this:—'I placed a tuning-fork perpendicularly on the side of a rectilineal rod. The vibrations were therefore communicated at right angles; when the axis of the oscillations of the fork coincided with the rod, the intensity of the transmitted vibrations was at its maximum. In proportion as the axis deviated from parallelism, the intensity diminished, and, when it became perpendicular, the intensity was a minimum.' The phenomena of polarisation may be observed in many chorded instruments. The chords of the harp are attached to a conductor which has

the same direction as the sounding-board; if any chord be altered from its quiescent position, so that its axis of oscillation shall be parallel with the bridge or conductor, its tone will be full; but if the oscillations be excited, so that their axes shall be at right angles with the conductor, the tone will be feeble.

POLE, *n. s.* & *v. a.* } Sax. þole: Armen. POLE-AXE. } *paol;* Fr. *pal;* Ital. *palo;* Lat. *palus.* A long staff; a long piece of timber erected; a rod, or perch, containing five yards and a half; any measure of length: to furnish with poles: a pole-axe, an axe fixed to a pole.

This ordinance of tithing them by the *pole* is not only fit for the gentlemen, but also the noblemen. *Spenser.*

Withered is the garland of the war,
The soldier's *pole* is fallen.
Shakspeare. Antony and Cleopatra.

Live to be the show and gaze o' th' time;
We'll have thee, as our rarer monsters are,
Painted upon a *pole*, and underwrit,
Here may you see the tyrant. *Shakspeare.*

A long *pole*, struck upon gravel in the bottom of the water, maketh a sound. *Bacon's Natural History.*

A peer of the realm and a counsellor of state are not to be measured by the common yard, but by the *pole* of special grace. *Bacon.*

Their houses *poles* set round meeting together in the top, and covered with skins. *Heylin.*

To beat religion into the brains with a *poleaxe* is to offer victims of human blood. *Howel.*

One hung a *poleaxe* at his saddle bow,
And one a heavy mace to stun the foe. *Dryden.*

Every *pole* square of mud, twelve inches deep, is worth sixpence a *pole* to fling out. *Mortimer.*

Begin not to *pole* your hops. *Id.*

If, after some distinguished leap,
He drops his *pole*, and seems to slip;
Straight gathering all his active strength,
He rises higher, half his length. *Prior.*

He ordered to arm long *poles* with sharp hooks, wherewith they took hold of the tackling which held the mainyard to the mast; then, rowing the ship, they cut the tackling, and brought the mainyard by the board. *Arbuthnot on Coins.*

POLE, *n. s.* } Fr. *pole;* Lat. *polus,*
PO'LAR, *adj.* } *polaris.* The extremity of
POLAR'ITY, *n. s.* } the earth's axis, north or
POLAR'Y, *adj.* } south: polar and polary
POLE-STAR, *n. s.* } are pertaining to or near either of the poles; having a tendency to one of the poles: polarity, such tendency.

If a pilot at sea cannot see the *polestar*, let him steer his course by such stars as best appear to him. *King Charles.*

As when two *polar* winds, blowing adverse
Upon the Cronian sea, together drive
Mountains of ice. *Milton's Paradise Lost.*

From the centre thrice to the utmost *pole*. *Milton.*

This *polarity* from refrigeration, upon extremity and defect of a loadstone, might touch a needle any where. *Browne's Vulgar Errours.*

Irons, heated red hot, and cooled in the meridian from North to South, contract a *polary* power. *Browne.*

From *pole* to *pole*
The forky lightnings flash, the roaring thunders roll. *Dryden.*

I was sailing in a vast ocean without other help than the *polestar* of the ancients. *Id.*

I doubt,
If any suffer on the *polar* coast,
The rage of Arctos, and eternal frost. *Prior.*

Heaven speed the canvass, gallantly unfurled,
To furnish and accommodate a world,
To give the *pole* the produce of the sun,
And knit the unsocial climates into one.— *Cowper.*

POLE, in astronomy, one of the points in the heavens round which the whole sphere seems to turn. It is also used for a point directly perpendicular to the centre of any circle's plane, and distant from it by the length of a radius.

POLE, in geography, one of the points on which the terraqueous globe turns; each of them being ninety degrees distant from the equator, and, in consequence of their situation, the inclination of the earth's axis, and its parallelism during the annual motion of our globe round the sun, having only one day and one night throughout the year. Owing to the obliquity with which the rays of the sun fall upon the poles, and the great length of the winter, the cold is so intense that those parts of the globe have never been fully explored, though the attempt has been repeatedly made by the most celebrated navigators. Their attempts indeed have chiefly been confined to the northern regions; for, with regard to the south pole, there is not the same incitement to attempt it. The great object for which navigators have adventured into these frozen seas was to find out a more ready passage to the East Indies; and this has been attempted three several ways: one by coasting along the northern parts of Europe and Asia, called the north-east passage; another, by sailing round the northern part of the American continent, called the north-west passage; and the third, by sailing directly over the pole itself. See POLAR REGIONS.

POLE, MAGNETIC. See MAGNET and MAGNETISM.

POLE (Reginald), cardinal, younger son of Sir Richard Pole, Lord Montague, was born at Stoverton Castle, in Staffordshire, in the year 1500. At seven years of age he was sent to a Carthusian monastery at Sheen, near Richmond in Surry; and thence, when about twelve, removed to Magdalen College, Oxford. In 1513 he took the degree of A. B., and was admitted to deacon's orders; in 1517 he was made prebendary of Salisbury, and in 1519 dean of Wimborne and Exeter. When about nineteen, he was sent to finish his studies at Padua in Italy, where he resided some time in great splendor, having a handsome pension from king Henry VIII. He returned to England in 1525, where he was graciously received at court; but, preferring study, he retired to the convent at Sheen, for about two years, when Henry began to divulge his scruples concerning his marriage with Catharine of Spain. Pole avoided all danger of giving offence, by asking leave to visit Paris and Italy; and his pension was continued. The king, having now divorced queen Catharine, married Anne Boleyn; and, being resolved to throw off the papal yoke, ordered Dr. Sampson to write a book in justification of his conduct, which he sent to Pole for his opinion. To this Pole, secure in the pope's protection, wrote an answer, entitled Pro Unitate Ecclesiastica, and

sent it to the king; who was so offended, that he withdrew his pension and all his preferments, and procured an act of attainder to be passed against him. In the mean time Pole was created a cardinal, and sent nuncio to different parts of Europe. At length the pope fixed him at Viterbo, where he continued till 1543, when he was appointed legate to the council of Trent, and was afterwards employed by the pope as his chief counsellor. Paul III. dying, in 1549, Pole was twice, it is said, elected his successor, and twice refused. On the accession of queen Mary, in 1553, cardinal Pole was sent legate to England, where he was received with great veneration, and conducted to the archbishop's palace at Lambeth, Cranmer being then prisoner in the Tower. The day after the execution of Cranmer, he was consecrated archbishop of Canterbury. In the same year, 1556, he was elected chancellor of the University of Oxford, and soon after of Cambridge; both which he visited by his commissioners. He died of a double quartan ague, in 1558, about sixteen hours after the death of the queen, and was buried in the cathedral of Canterbury. He seems to have been a man of mild manners, and of real worth. He wrote De Ecclesiæ Potestate, A Treatise on Justification, and various other tracts.

POLE'CAT, *n. s.* i. e. Pole or Polish cat, because they abound in Poland. The fitchew; a stinking animal; a name of reproach.

Polecats? there are fairer things than *polecats.* *Shakspeare.*

Out of my door, you witch! you hag! you *polecat.* *Id.*

She, at a pin in the wall, hung like a *polecat* in a warren, to amuse them. *L'Estrange.*

How should he, harmless youth,
Who killed but *polecats*, learn to murder men? *Gay.*

POLECAT. See MUSTELA.

PO'LEDAVY, *n. s.* A sort of coarse cloth. Ainsworth.

Your *poledavy* wares will not do for me. *Howel.*

POLEIN, in English antiquity, a sort of shoe, sharp or peaked at the point. This fashion took its rise in the time of king William Rufus; and the picks were so long that they were tied up to the knees with silver or golden chains. They were forbidden by stat. an. 4 Edw. IV. cap. 7. Tunc fluxus crinium, tunc luxus vestium, tunc usus calceorum cum arcuatis aculeis, inventus est.—Malmesb. in Will. II.

POLEMARCHUS, in ancient history, a magistrate at Athens, who had under his care all the strangers and sojourners in the city. It was his duty to offer a solemn sacrifice to Enyalus (said to be the same with Mars, though others will have it that he was only one of his attendants), and another to Diana, surnamed *Αγροτερα*, in honor of the famous patriot Harmodius. It was also his business to take care that the children of those that had lost their lives in the service of their country should be provided for out of the public treasury.

POLEMBERG (Cornelius), a celebrated Dutch painter, born at Utrecht in 1586. His best pieces are of the cabinet size. He was brought over to England by king Charles I.; but, though highly encouraged, preferred returning to Utrecht, where he died in 1660.

POLEMIC, *adj.* & *n. s.* } Greek πολεμικος.
POLEMICAL. } Controversial: disputative: a disputant.

Among all his labours, although *polemick* discourses were otherwise most uneasy, as engaging to converse with men in passion. *Fell.*

I have had but little respite from these *polemical* exercises, and, notwithstanding all the rage and malice of the adversaries of our church, I sit down contented. *Stillingfleet.*

The nullity of this distinction has been solidly shown by most of our *polemick* writers of the protestant church. *South.*

The best method to be used with these *polemical* ladies is to show them the ridiculous side of their cause. *Addison.*

Each staunch *polemick*, stubborn as a rock,
Came whip and spur. *Pope.*

He signalised himself in the schools, as a philosopher and *polemick* of extensive knowledge and deep penetration; and went through all the courses with a wise regard to the dignity and importance of each science. *Johnson.*

POLEMO, or POLEMON, an Athenian of distinguished birth, who succeeded Xenocrates in the direction of the academy, but in the earlier part of his life was a man of loose morals. Returning home one morning in a state of intoxication he broke into the school of Xenocrates, while he was lecturing in the midst of his disciples. Xenocrates, immediately turning his discourse to the subjects of temperance and modesty, recommended these virtues with such energy of language, and strength of argument, that, instead of ridiculing the philosopher, as he intended, Polemo became quite ashamed of his own folly, and resolved to devote his life from that moment to the study of wisdom. Accordingly, from his thirtieth year, he constantly practised the most rigid virtue and hardy fortitude; though the austerity of his manners was tempered with urbanity and generosity. He died at an advanced age of a consumption, about A. A. C. 270. Of his tenets little is said by the ancients, because he strictly adhered to the doctrine of Plato.

POLEMON, a son of Zeno the rhetorician, and a renowned sophist. He was made king of Pontus by Marc Antony, and was succeeded by his son Polemon II. See PONTUS.

POLEMONIUM, in ancient geography, a town of Pontus, on the east bank of the mouth of the Thermodoon; now called Vatija.

POLEMONIUM, in botany, Greek valerian, or Jacob's ladder, a genus of the monogynia order, and pentandria class of plants; in the natural method ranking under the twenty-ninth order, campanaceæ. The corolla is quinquepartite; the stamina inserted into scales, which close the bottom of the corolla; the stigma is trifid: the capsule bilocular superior. There are two species: the most remarkable is P. cœruleum, with an empalement longer than the flower. It grows naturally in some places of England: however, its beauty has obtained it a place in the gardens. There are three varieties; one with a white, another with a blue, and another with a variegated flower; also a kind with varie-

gated leaves. They are easily propagated by seeds; but that kind with variegated leaves is preserved by parting its roots, because the plants raised from seeds would be apt to degenerate and become plain.

A POLEMOSCOPE, in optics, is the same with an opera glass.

POLENBURG (Cornelius), an excellent painter of little landscapes and figures. See POLEMBERG. He was educated under Blomaert, whom he soon quitted to travel into Italy; and studied long in Rome and Florence, where he formed a style entirely new, which, though preferable to the Flemish, is unlike any Italian, except in his having adorned his landscapes with ruins. There is a varnished smoothness and finishing in his pictures that render them always pleasing, though simple, and too nearly resembling one another. At London he painted the figures in Steenwyck's perspectives, for king Charles I., but staid only four years. His works are very scarce and valuable.

POLERON, one of the Banda or Nutmeg Islands in the East Indies. It was one of those spice islands which put themselves under the protection of the English, and voluntarily acknowledged James I., king of England, for their sovereign; for which reason the natives of this and the rest of the islands were murdered or driven thence by the Dutch, together with the English.

POLES, in castrametation, long round pieces of wood, by which a marquée or tent is supported. There are three sorts, viz. ridge-pole, a long round piece of wood, which runs along the top of an officer's tent or marquée, and is supported by two other poles, viz. front-pole, a strong pole which is fixed in the front part of an officer's tent or marquée, and is kept in a perpendicular position by means of two strong cords, called weather cords, that run obliquely from each other across two other cords from the rear-pole, and are kept fast to the earth by wooden pegs. Rear-pole, a strong pole which is fixed in the back-part of an officer's marquée or tent, and is kept in the same relative position as has been described above.

Fire-POLES, or RODS, are also artificial fireworks. They are generally of the length of ten or twelve feet, and of the thickness of two inches at most. One of the ends of the fire-pole is hollowed out with three or four flutes to the length of two or three feet. Into one of these flutes are fixed rockets or squibs. Paper crackers are fixed in the others. After holes have been bored through the body of the pole, in order that the rockets may have communication with the crackers, they must be neatly wrapped in paper, the more effectually to deceive the spectators.

POLES, PICKET, in military affairs, round pieces of wood shod with iron, and driven firmly into the earth, to fasten cavalry by when at picket. The poles for the heavy horse should be longer than those which are commonly used. See PICKETS.

POLETÆ, were ten magistrates of Athens, who, with three that had the management of money allowed for public shows, were empowered to let out the tribute money and other public revenues, and to sell confiscated estates; all which bargains were ratified by their president, or in his name. They were by their office also bound to convict such as had not paid the tribute called μετοικιον, and sell them in the market by auction. The market where these wretches were sold was called πωλητημον τȣ μετοικιȣ.

POLEY MOUNTAIN, or POLEY GRASS, is a species of lythrum.

POLHEM (Christopher), a Swedish engineer, was born in Gothland in 1661. Charles XI. sent him to travel, when he remained some time at Paris. Our George I. afterwards invited him to Hanover, to superintend the working of the Hartz mines; but he preferred returning to his native country. Sweden owes to Polhem a great number of ingenious and useful inventions in mining, draining, docks, and canals; and he particularly displayed his genius in his plans for the construction of the canal of Trollhaetta, and the basin of Carlscrona. He was rewarded by a patent of nobility, and the title of counsellor of commerce. He was also a member of the Academy of Sciences at Stockholm, to whose Transactions he furnished many contributions. His death took place August 31st, 1751.

POLIAS, a surname of Minerva, as the protectress of cities.

POLICE', *n. s.* Fr. *police.* The government of a city or country, so far as regards the inhabitants.

Where there is a kingdom altogether unable or indign to govern, it is a just cause of war for another nation, that is civil or *policed*, to subdue them.

Bacon's Holy War.

By establishing or separating the different boards of finance, *police*, &c., from the courts of law, which before impeded each other by meeting in the same place, she has facilitated the dispatch of business, and rendered the administration of justice more speedy. *Coxe.*

POLICE, Gr. πολις, a city. This term, or 'Public Police and Economy,' is applied by Blackstone to signify the due regulation and domestic order of the kingdom: it is more generally applied to the internal regulations of large cities and towns, particularly of the metropolis. See 4 Comm. c. 13. p. 162.

The police of the metropolis, says Colquhoun, is a system highly interesting to be understood: but a vast proportion of those who reside in the capital, as well as the multitude of strangers who resort to it, have no accurate idea of the principles of organisation which move so complicated a machine: establishing those conveniences and accommodations, and preserving that regularity which prevails, in the particular branches of police which may be denominated municipal regulations. These relate to paving, watching, lighting, cleansing, and removing nuisances; furnishing water; the mode of building houses; the system established for extinguishing fires; and for regulating coaches, carts, and carriages; with a variety of other useful improvements tending to the comfort and convenience of the inhabitants. See Colquhoun's Treatise.

To administer that branch of the police which is connected with the prevention and suppression

of crimes, twenty-six magistrates, viz. the lord mayor and aldermen, sit in rotation every forenoon, and take cognizance of all complaints within the ancient jurisdiction of the city of London. See LONDON.

For every other part of the metropolis twenty-four stipendiary magistrates are appointed; three at Bow Street, under a jurisdiction long established; and twenty-one, first established by stat. 32 Geo. III., c. 53 (generally called the Police Act). This act was repealed, and other provisions of a similar nature were enacted by various acts, as 54 Geo. III. c. 37, &c. These twenty-one magistrates have seven different offices of courts of justice assigned them, at convenient distances, in Westminster, Middlesex, and Surrey; where they sit every day, Sundays excepted, one justice from ten in the morning till eight in the evening, and two from twelve till three; for the purpose of executing those multifarious duties connected with the office of a justice of peace which occur in large societies. This institution was suggested to the legislature in consequence of the pressure felt by the public from the want of some regular tribunals, where the system should be uniform, and where the purity of magistrates, and their regular attendance, might insure to the lower orders of the people the adjustment of their differences at the least possible expense; and the assistance of gratuitous advice in every difficulty, as well as official aid in all cases within the sphere of the magistrate. Similar provisions are made to prevent depredation on the Thames, by the acts 39 and 40 Geo. III. c. 87; 42 Geo. III. c. 76; 47 Geo. III. stat. 1, c. 37; and 54 Geo. III. c. 187, usually called the Thames Police Acts.

The duty of these stipendiary magistrates, in conjunction with the county magistrates, extends also to several judicial proceedings, where, in various instances, they are empowered and required to hear and determine offences in a summary way; particularly in cases relating to the customs and excise; game-laws; pawnbrokers; laborers; and apprentices, &c. They act ministerially in licensing and regulating public-houses; punishing vagrants; removing the poor, &c., &c. And examine into complaints in criminal cases, capital and others, for the purpose of sending them to superior tribunals for trial.

The following is an abstract of the Civil Municipal Regulations of the police of the metropolis:—

The metropolis having by degrees been extended so far beyond its ancient limits, every parish, hamlet, liberty, or precinct, now contiguous to the cities of London and Westminster, may be considered as a separate municipality; where the inhabitants regulate the police of their respective districts, raise money for paving the streets, and assess the householders for the interest thereof, as well as for the annual expense of watching, cleansing, and removing nuisances and annoyances. These funds, as well as the execution of the powers of the different statutes creating them (excepting where the interference of magistrates is necessary), are placed in the hands of trustees; of whom, in many instances, the churchwardens or parish officers, for the time being, are members ex officio; and, by these different bodies, all matters relating to the immediate safety, comfort, and convenience of the inhabitants, are managed and regulated; under the provisions of statutes made in the last and present reign, as well public as private, applicable to the metropolis in general, and to the various parishes, hamlets, and liberties in particular; former statutes for these purposes having been found inadequate. The stat. 10, Geo. II. c. 22, established a system for paving, lighting, cleansing, and watching the city of London; but the statute which removed signs and sign-posts, balconies, spouts, gutters, and those other encroachments and annoyances which were felt as grievances by the inhabitants, did not pass till the year 1771. The stat. 11 Geo. III., c. 29, contains a complete and masterly system of that branch of the police which is connected with municipal regulations; and may be considered as a model for every large city in the empire. This statute extends to every obstruction by carts and carriages, and provides a remedy for all nuisances which can prove, in any respect, offensive to the inhabitants; and special commissioners, called commissioners of sewers, are appointed to ensure a regular execution. This statute is improved by stat. 33 Geo. III. c. 75; by which the power of the commissioners is increased, and some nuisances, arising from butchers, dustmen, &c., further provided against. Various acts are from time to time passed for local improvements in streets, squares, docks, &c.

In the city and liberty of Westminster also many new and useful municipal regulations have been made within the present century. The stats. 27 Eliz. and 16 Car. 1 (private acts) divided the city and liberties into twelve wards, and appointed twelve burgesses to regulate the police of each ward, who, with the dean or high steward of Westminster, were authorised to govern this district of the metropolis. The stat. 29 Geo. II., c. 25, enabled the dean or his high steward to choose eighty constables in a court-leet; and the same act authorised the appointment of an annoyance-jury of forty-eight inhabitants, to examine weights and measures, and to make presentments of every public nuisance either in the city or liberty. The stat. 31 Geo. II. c. 17, 25, improved the former statute, and allowed a free market to be held in Westminster. The stat. 2 Geo. III. c. 21, amended by stat. 3, Geo. III. c. 23, extended and improved the system for paving, cleansing, lighting, and watching the city and liberty, by including six other adjoining parishes and liberties in Middlesex. The stats. 5 Geo. III. cc. 13, 50; 11 Geo. III c. 22; and particularly 14 Geo. III. c. 90, for regulating the nightly watch and constables, made further improvements in the general system; by which those branches of police in Westminster are at present regulated. See also 44 Geo. III. c. 61; 45 Geo. III. c. 113; 46 Geo. III. c. 89; and 48 Geo. III. c. 137, under which many improvements have been made in Westminster, with a view to the convenience and dignity of the courts of justice and houses of parliament.

In the borough of Southwark also the same

system has been pursued: the stats. 28 Geo. II. c. 9, 6 Geo. III. c. 24, having established a system of regulation applicable to this district of the metropolis; relative to markets, hackney-coach stands, paving, cleansing, lighting, watching, marking streets, and numbering houses; and placing the whole under the management of commissioners.

The stat. 9 Ann. c. 23 first established the regulations with regard to hackney-coaches and chairs, which have been improved and extended by several subsequent statutes; see London; and stat. 33 Geo. III. c. 75, § 15—19, which enlarges the power of the magistrates of the city of London, to compel the appearance of hackney-coachmen residing out of their immediate jurisdiction.

Carts and other carriages have also been regulated by different statutes, viz. stats. 1 Geo. I., stat. 2. c. 57; 18 Geo. II. c. 33; 24 Geo. II. c. 43; 30 Geo. II. c. 22; 7 Geo. III. c. 44; 24 Geo. III. stat. 2, c. 27; which contain a very complete system relative to this branch of police: by virtue of which all complaints arising from offences under these acts are cognizable by the magistrates in a summary way

The stat. 34 Geo. III. c. 65 established an improved system with regard to watermen plying on the river Thames. The lord mayor and aldermen are empowered to make rules and orders for their government; and with the recorder of the city, and justices of the peace ot the respective counties and places next adjoining to the Thames, between Gravesend and Windsor, have power, within those districts, to put in execution not only the laws, but also the rules and orders to be from time to time made by them relative to such watermen: such rules and orders to be from time to time sent to the public office in the metropolis, and to the clerks of the peace of the counties joining the Thames, within thirty days after they are made or altered. The magistrates have power given them to fine watermen for extortion and misbehaviour: and persons refusing to pay the legal fares may be compelled so to do with all charges, or be imprisoned for a month; and persons giving watermen a fictitious name or place of abode shall forfeit £5. See Watermen. A new declaration of the just fares of the watermen was published as we were preparing for press.

Offences relative to the driving of cattle improperly, usually termed bullock-hunting, are also determinable by the magistrates in the same summary way, under the authority of stat. 21 Geo. III. c. 67; by which every person is authorised to seize delinquents guilty of this very dangerous offence.

The last great feature of useful police to be here mentioned consists in the excellent regulations relative to buildings, projections, and fires; first adopted after the fire of London in 1666, and extended and improved by several statutes from that time down to the stat. 14 Geo. III. c. 78. This statute repeals all former acts, and, besides regulating the mode of building houses in future, so as to render them ornamental, commodious, and secure against the accidents of fire, established other useful rules for the prevention of this dreadful calamity; by rendering it incumbent on the churchwardens to provide engines and ladders; to fix fire-plugs at convenient distances on all the main pipes in the parish; to fix a mark in the street where they are to be found, and where there is a key ready to open the plugs: rewards are also payable to persons bringing the engines to a fire.

These outlines will explain, in some measure, by what means the system of the police, in most of its great features, is conducted in the metropolis; to which it may be necessary to add, that the beadles of each parish are the proper persons to convey informations, in case of any inconvenience or nuisance, by which a stranger may have it removed. The city and police magistrates, in their respective courts, if not immediately authorised to remedy the wrong complained of, will point out how it may be effected. The new arangement tnat nas ate y oeen adopted of substituting active men, under the control of the home department, for the feeble old men which for a number of years had been entrusted nightly with the care of the property in the metropolis appears fully to answer the end for which it was intended. The city and suburbs are now much better watched than formerly, though this arrangement costs considerably more than the old plan.

POLICHNA, 1. An ancient town of Troas, on Ida. Herodot. vi. c. 28; 2. Another in Crete. Thucyd. ii. c. 85.

POLICY, *n. s.* Gr. πολιτεια; Lat. *politia*. The art of government, particularly with respect to foreign powers; art; prudence; management; stratagem.

If it be honour in your wars to seem
The same you are not, which for your best ends
You call your *policy*, how is't less or worse,
But it shall hold companionship in peace
With honour as in war? *Shakspeare. Coriolanus.*

If she be curst it is for *policy*,
For she's not freward, but modest.
Shakspeare.

The best rule of *policy* is to prefer the doing of justice before all enjoyments. *King Charles.*

The wisdom of this world is sometimes taken in scripture for *policy*, and consists in a certain dexterity of managing business for a man's secular advantage.
South.

Policy of Insurance, or assurance of ships, is a contract, whereby a person takes upon himself the risks of a sea voyage; obliging himself to make good the losses and damages that may befal the vessel, in part or in whole; in consideration of a certain sum per cent. paid, according to the risk run. See Marine Insurance.

POLIDORO da Caravaggio, an eminent painter, born at Caravaggio, in the Milanese, in 1492. He went young to Rome, where he worked as a laborer in preparing stucco for the painters; and, seeing them at work in the Vatican, he solicited some of them to teach him the rules of designing. He attached himself particularly to Maturino, a young Florentine; and, a similarity in talents and taste producing a disinterested affection, they associated like brothers, labored together, and lived on one common purse, until the death of Maturino. He practised the chiaroscuro in a degree superior to any

in the Roman school; and finished an incredible number of pictures in fresco and in oil, for the public buildings. Being obliged to fly from Rome when it was pillaged, he retired to Messina, where he obtained a large sum of money, by painting the triumphal arches for the reception of Charles V. after his victory at Tunis; but, when he was preparing to return to Rome, he was murdered for the sake of his riches, by a Sicilian valet and other assassins, in 1543.

POLIEA, a festival at Thebes in honor of Apollo, who was there represented with gray hairs, πολιος, contrary to the practice of all other places. An ox was also sacrificed, and formerly a bull, till once that one could not be got.

POLIGNAC (Melchior De), a celebrated French cardinal, born of an ancient and noble family at Puy, in 1662. He was sent by Louis XIV. ambassador extraordinary to Poland, where, on the death of Sobieski, he formed a project of procuring the election of the prince of Conti. But failing, he returned home under some disgrace; when restored to favor, he was sent to Rome as auditor of the Rota. He was plenipotentiary during the congress at Utrecht, when Clement I. created him a cardinal; and upon the accession of Louis XV. was appointed to reside at Rome as minister of France. He remained there till 1732, and died in 1741. He left a MS. poem entitled Anti-Lucretius, seu De Deo et Naturâ; the plan of which is said to have been formed in Holland in a conversation with Mr. Bayle. This celebrated poem was first published in 1749, and has since been several times printed in other countries. He had been received into the French Academy in 1702, into the Academy of Sciences in 1715, into that of the Belles Lettres in 1717.

POLIGNY, an agreeable and well built post-town of the department of the Jura, France, the chief place of a subprefecture, or arrondissement of the same name, with a population of 4500 inhabitants; having an agricultural society, a communal college, and an inferior court of judicature at Arbois. It is pleasantly situated at the foot of a mountain, that forms part of the Jura chain, standing in a fertile country near the source of the Glantine. It is adorned with several public fountains. The shambles, which are erected under an arch, crossed by a canal of running water, are kept remarkably clean. Near the same spot also is a grotto, curious on account of its congelations. The manufactures consist of casks, common delfware, saltpetre, and oils, and there are some dye-houses, tan-yards, and saw-mills. In the neighbourhood are some quarries of marble and alabaster. The inhabitants carry on a trade in grain, flour, excellent red wine, brandy, turnery goods, delf, leather, rape seed, &c. This town is twenty-one miles, N. N. E. of Lous-le-Saulnier, forty-two south of Besançon, and 289 south-east of Paris.

POL'ISH, *v. a.*, *v. n.* & *n. s.* } Fr. *polir*;
POL'ISHER, *n. s.* } Lat. *polio*. To smooth; brighten by attrition; gloss: to receive a gloss: the gloss effected; elegance of manner; polite breeding.

He setteth to finish his work, and *polisheth* it perfectly. *Ecclus.*

It was reported by the ancients, that there was a kind of steel, which would *polish* almost as white and bright as silver. *Bacon.*

Studious they appear
Of arts that *polish* life, inventors rare.
Milton.

Not to mention what a huge column of granite cost in the quarry, only consider the great difficulty of hewing it into any form, and of giving it the due turn, proportion, and *polish*. *Addison on Italy.*

What are these wond'rous civilising arts,
This Roman *polish*, and this smooth behaviour,
That render man thus tractable and tame?
Addison.

I consider a human soul without education like marble in the quarry, which shews none of its inherent beauties, till the skill of the *polisher* fetches out the colours. *Id.*

Another prism of clearer glass and better *polish* seemed free from veins. *Newton's Opticks.*

Pygmalion, with fatal art,
Polished the form that stung his heart.
Granville.

As his parts were extraordinary, so he well knew how to improve them; and not only to *polish* the diamond, but enchase it in the most solid and durable metal. *Johnson.*

POLISHER, or burnisher, among mechanics, is an instrument for polishing and burnishing things proper to take a polish. The gilders use an iron polisher to prepare their metals before gilding, and the blood-stone to give them the bright polish after gilding.

POLISHERS, among cutlers, are a kind of wooden wheels made of walnut tree, about an inch thick, and of a diameter at pleasure, which are turned round by a great wheel; upon these they smooth and polish their work with emery and putty.

POLISHERS for glass consist of two pieces of wood; the one flat, covered with old hat; the other long and half round, fastened on the former, whose edge it exceeds on both sides by some inches, which serves the workmen to take hold of, and to work backwards and forwards by.

POLISHERS used by spectacle-makers are pieces of wood a foot long, seven or eight inches broad, and an inch and a half thick, covered with old beaver hat, whereon they polish the shell and horn frames their spectacle glasses are to be set in.

POLITE', *adj.* } Lat. *politus*. Glossy;
POLITE'LY, *adv.* } smooth; refined or ele-
POLITE'NESS, *n. s.* } gant in behaviour: the adverb and noun substantive corresponding with this last sense.

If any sort of rays, falling on the *polite* surface of any pellucid medium, be reflected back, the fits of easy reflection, which they have at the point of reflexion, shall still continue to return. *Newton.*

Some of them are diaphanous, shining, and *polite*; other not *polite*, but as if powdered over with fine iron dust. *Woodward.*

A nymph of quality admires our knight,
He marries, bows at court, and grows *polite*.
Pope.

I have seen the dullest men aiming at wit, and others, with as little pretensions, affecting *politeness* in manners and discourse. *Swift*

As in smooth oil the razor best is whet,
So wit is by *politeness* keenest set. *Young.*

POLITE ARTS. See ARTS.

POLITENESS is by lord Chesterfield called the art of pleasing. It has also been called an artificial good nature; and indeed good nature is the foundation of true politeness; without which art will make but a very indifferent figure, and wit generally defeat its own ends. 'True politeness,' it has been well said, 'is that continual attention which humanity inpires us with, both to please others, and to avoid giving them offence. The surly plain-dealer exclaims loudly against this virtue, and prefers his own bluntness and Gothic freedom. The reason generally is because they are his own. The courtier and fawning flatterer, on the contrary, substitute in its place insipid compliments, cringings, and a jargon of unmeaning sentences. The one blames politeness, because he takes it for a vice; and the other is the occasion of this, because that which he practises is really so. 'He who thinks himself sure of pleasing,' 'says lord Chesterfield, 'and he who despairs of it, are equally sure to fail.' And he is undoubtedly in the right. The one, by his assuming vanity, is inattentive to the means of pleasing; and the other, from fear, is rendered incapable of them. Some of the best rules on this subject (as far indeed as it can be a matter of rule), with strictures on particular kinds of impoliteness, may be found in the Spectator, Rambler, Idler, Lounger, Mirror, and Knox's Essays. Lord Chesterfield's Letters are also worthy of perusal, provided the reader be on his guard against insincerity and other vices which they are calculated to infuse, and provided he always bear in mind that true politeness does not consist in specious manners and dissimulation, but that it must always be founded on real worth and virtue.

POLITI (Alexander), a learned Italian, born at Florence in 1679, and distinguished for sagacity, and an extensive memory. He taught philosophy, theology, and rhetoric, at Genoa; and afterwards Greek at Pisa. He published an edition of Homer, with Eustathius's commentary, and added a Latin translation, with notes. He died of an apoplexy in 1752.

POLITIAN (Angelo), was born at Monte Pulciano in Tuscany, in 1454. He learned Greek under Andronicus; and philosophy under Ficinus and Argyropylus. He was one of the most learned writers of his time. The first work which gained him a reputation was a poem on the tournament of Julian de Medicis. The account he wrote some time after of the conspiracy of the Pazzi's was very much esteemed. He wrote many other pieces which have merited approbation; but his Epistles have been most read. He died at the age of forty years. His morals answered the homeliness of his face rather than the fineness of his genius.

POL'ITIC, *n. s.*
POLIT'ICAL, *adj.*
POLIT'ICALLY, *adv.*
POLIT'ICASTER, *n. s.*
POLITI'CIAN,
POL'TICLY,
POL'ITICS,
POL'ITY,

Lat. *politia*; Gr. *πολιτεια*. Form of government or civil constitution: political and politic mean, relating to the administration of public affairs; civil; hence prudent; skilful; wise; cunning; the latter word is generally used in modern times in the latter senses, while political is restricted to that which pertains to public affairs: politically and politicly follow these senses: a politicaster is a quack in politics, see the extract: politician, one versed in the arts or secrets of government; also a shrewd or cunning man: politics (Fr. *politique*), is the science of public government; the practice or art of administering the public affairs.

Virtuously and wisely acknowledging that he with his people made all but one *politic* body, whereof himself was the head; even so cared for them as he would for his own limbs. *Sidney.*

Because the subject which this position concerneth is a form of church government, or church *polity*, it behoveth us to consider the nature of the church, as is requisite for men's more clear and and plain understanding, in what respect laws of *polity* or government are necessary thereunto. *Hooker.*

The Turks *politically* mingled certain Janizaries, harquebusiers, with their horsemen. *Knolles.*

And 't be any way, it must be with valour; for *policy* I hate: I had as lief be a Brownist as a *politician.* *Shakspeare.*

This land was famously enriched
With *politic* grave counsel; then the king
Had virtuous uncles. *Id. Richard III.*

Thus have I *politicly* begun my reign,
And 'tis my hope to end successfully.
Shakspeare.

Authority followeth old men, and favour youth; but for the moral part, perhaps youth will have the pre-eminence, as age hath for the *politick.* *Bacon.*

Although I may seem less a *politician* to men, yet I need no secret distinctions nor evasions before God. *King Charles.*

Your ill-meaning *politician* lords,
Under pretence of bridal friends and guests,
Appointed to await me thirty spies. *Milton.*

In the Jewish state, God was their *political* prince and sovereign, and the judges among them were as much his deputies, and did represent his person, as now the judges do the persons of their several princes in all other nations. *Kettlewell.*

No civil or *politic* constitutions have been more celebrated than his by the best authors. *Temple.*

While emp'rick *politicians* use deceit,
Hide what they give, and cure but by a cheat,
You boldly show that skill which they pretend,
And work by means as noble as your end.
Dryden.

Be pleased your *politics* to spare,
I'm old enough and can myself take care. *Id.*

There are quacks of all sorts; as bullies, pedants, hypocrites, empiricks, law-jobbers, and *politicasters.* *L'Estrange.*

The *polity* of some of our neighbours hath not thought it beneath the public care to promote and reward the improvement of their own language. *Locke on Education.*

If a man succeeds in any attempt, though undertook with never so much rashness, his success shall vouch him a *politician*, and good luck shall pass for deep contrivance; for give any one fortune, and he shall be thought a wise man. *South.*

It would be an everlasting reproach to *politicks*, should such men overturn an establishment formed by the wisest laws, and supported by the ablest heads. *Addison.*

More true *political* wisdom may be learned from this single book of proverbs, than from a thousand Machiavels. *Rogers.*

Coffee, which makes the *politician* wise,
And see through all things with his half-shut eyes,
Sent up in vapours to the baron's brain
New stratagems, the radiant lock to gain. *Pope.*

No less alike the *politic* and wise,
All fly slow things, with circumspective eyes;
Men in their loose unguarded hours they take,
Not that themselves are wise, but others weak. *Id.*

The dutchess hath been most *politicly* employed in sharpening those arms with which she subdued you. *Id.*

Of crooked counsels and dark *politics*. *Id.*

It was not by any means unfit that a judge should form part of a council, which was to preserve the rights of sovereigns, but where no party *politics* prevailed. But here, in fact, the judge was under the control of the executive government, and instantly became a party *politician*. *Canning.*

POLITICS. Lord Bacon divides politics into three parts, viz. the preservation of the state, its happiness and flourishing, and its enlargement. Of the first two, he informs us, various authors have treated, but the last has never been handled; and he has given a specimen of an essay to supply the want.

POLITICAL ECONOMY. It has been said to be a sign of the times upon which we are justified in resting many hopes of the future improvement of our race, that, so considerable a degree of attention has been excited to the subject of political economy. This science has been exhibited as the great high road to public and private happiness; in which 'no groping, no perplexing research, no hopeless, thankless toil is required; the principal difficulties are overcome; all that remains to be done is, we are told, to remove the obstacles which conceal that road from the view of those who are less fortunate than *ourselves*.' We have certainly been brought to believe that political economists have furnished many useful hints for the improvement of the condition of mankind; that they have explored various causes by which former plans of improvement have been checked; and achieved the destruction of some ancient systems of political and commercial legislation, to which we have no desire to return. We also give them credit for diligence of research and operation in the face of those numerous and powerful parties, which, under all established systems, are interested in the perpetuation of abuses. But we smile at their hardihood in venturing to claim for their inheritance the pretensions of the French perfectibiliticians; and this chiefly from the 'readiness with which all the late discoveries in commercial science have been received and assented to.'* The fact is, when the name of the late Mr. Ricardo is excluded, these writers scarcely attempt to adduce, either at home or abroad, that of a single *discoverer* in political economy; the greatest praise is due to those able men amongst them who have abjured any such distinction; and the chief advantages, as yet, which have occurred to the public from the discussions connected with it, are rather to be found in what has been exploded than in any thing they have established.

Mr. M'Culloch has well said—'There is a peculiarity in the political and economical sciences which deserves to be noticed, inasmuch as it serves to show the superior necessity and importance of general instruction in their principles. The peculiarity in question originates in the circumstance of the politician or economist being extremely apt to be influenced by other considerations than a regard to the interests of truth and the public welfare. The cultivators of the mathematical and physical sciences, can very rarely have any motive to bias their judgments, or to induce them to conceal or pervert the truth. But such is not the case with those who discuss political or economical questions. Every abuse, and every vicious and unjust institution and regulation, operates as a bounty on the production of false theories; for, though injurious to the public, they are almost always productive of advantage to a greater or smaller number of individuals, who, to preserve this advantage, enlist a portion of the press into their service, and labor, by means of perverted and fallacious statements, to make the public believe that the abuse is really beneficial to them, and that they are interested in its support. These attempts to make the worse appear the better cause, or to make the most flagrant abuses be viewed as national benefits, have very often been attended with complete success. And there are plainly no means of obviating this evil, of correcting what is really disadvantageous in the influence of the press, and of preventing the public from being misled by the specious sophistry of those whose interest and object it is to delude them, except by making them generally acquainted with the elementary and fundamental truths of this science .... Ignorance is the impure and muddy fountain whence nine-tenths of the vice, misery, and crime, to be found in the world are really derived. Make the body of the people once fully aware of the circumstances which really determine their condition, and you may be assured that an immense majority will endeavour to turn that knowledge to good account.'

This we fully believe; but for the very reasons here assigned, i. e. the bounties that so quickly arise for the '*production* of false theories,' &c.; why, we ask, are our modern investigators of this science so prone *to theorize?* and why can they not content themselves, in common with the real promoters of many other valuable sciences, with recording experiments, for awhile, and collecting well-attested facts?

Looking into their best works we stumble at the threshold, and can find no two accredited writers agreed in a definition of the chief terms of this so-named science, having its foundation, according to Mr. M'Culloch and the West-

* This is the language of one of their boastful advocates:—'Not only have they pointed out these causes of evil, but, fearlessly braving the prejudices of the ignorant and vulgar, they have brought to light a remedy by which that evil may be averted. If, therefore, they are of opinion that the perfectibility of the species is a mere vision, although bright and fascinating to dwell upon, they have, at all events, produced a plan by which a large addition may almost immediately be made to human happiness, and which will ultimately raise the species to a state at least *approaching to the perfectibility* which has been aimed at.'—*Westminster Review*, No. VII.

minster Review, in the 'Enquiry into the Nature and Causes of the Wealth of Nations,' by Dr. Smith. Mr. Malthus tells us, that by wealth is to be understood all 'those *material* objects which are necessary, useful, or agreeable to man,' to which Mr. M'Culloch very soundly objects, observing that this definition is too comprehensive, as it would include such material products as atmospheric air, and the heat of the sun, which are highly useful and agreeable, yet, by universal consent, are excluded from the investigations of political economy: he proposes, therefore, to limit the definition of wealth to those objects alone which have exchangeable value, and it will then stand thus, 'those material products which have exchangeable value, and which are either necessary, useful, or agreeable to man.'

This writer is very tenacious of the propriety of confining the definition of wealth to material objects. Having observed that some economists had considered wealth as synonymous with all that man desires as useful and agreeable to him, he adds, 'But if political economy were to embrace a discussion of the production and distribution of all that is useful and agreeable, it would include within itself every other science; and the best Encyclopædia would really be the best treatise on political economy. Good health is useful and delightful; and, therefore, on this hypothesis, the science of wealth ought to comprehend the science of medicine. Civil and religious liberty are highly useful, and, therefore, the science of wealth must comprehend the science of politics. Good acting is agreeable, and therefore, to be complete, the science of wealth must embrace a discussion of the principles of the histrionic art, and so on. Such definitions are worse than useless. They can have no effect but to generate confused and perplexed notions respecting the objects and limits of the science, and to prevent the student ever acquiring a clear and distinct idea of the nature of the enquiries in which he is engaged.'

Political economy we are therefore told, in the latest and best publication of our author, has for its object to point out '*the means by which the industry of man may be rendered most productive* of those necessaries, comforts, and enjoyments which constitute wealth,' a definition to which we see no fair objection. But when this gentleman afterwards proceeds to insist that *labor* is the only source of wealth, we are once more startled. 'Independently of labor,' he says truly, 'matter is rarely of any use whatever, and (but this we dispute) is never of any value. Place us on the banks of a river,' he adds, 'or in an orchard, and we shall infallibly perish either of thirst or hunger, if we do not, by an effort of *industry*, raise the water to our lips, or pluck the fruit from the parent tree.'

This last specimen of industry is certainly needful in the situation described, and something rather more properly to be termed 'labor' in most others; but if our good mother earth had not been previously the source of the apples, and the channel of the water, we should like to know to what effect these extraordinary exertions would be made? If labor be, in strict philosophy, the only source of wealth, then it might be produced, as it has been well observed, '*without the* assistance of land;' and

Dipping buckets into empty wells

Might by some happy 'discovery' be no longer connected with

—Growing old in drawing nothing up.

We must be pardoned, indeed, for adding, that these lines would form a happy descriptive definition of the chief employment on this high road to happiness, if this doctrine be true.

More seriously—we fully adopt the sentiments of the Quarterly Reviewer on this notable illustration of Mr. M'Culloch's. 'It is necessary to exert much more labor than the effort of industry here described to obtain the use of silver and gold; but to say that human labor is the sole source of these metals would surely be a most strange and useless perversion of terms. As well might we say, when two men were cooperating in carrying a log of wood, which was too heavy for either of them separately, that one was the sole carrier, because, without the effort of industry made by him, the log might have remained unmoved and useless. We totally disapprove of such futile and unnecessary attempts at simplification. We are disposed to consider labor as a most essential source of wealth; but knowing, with Adam Smith, the absolute necessity of the co-operation of land to give us food, clothing, lodging, &c. &c., we see no kind of reason why we should not acknowledge, with him, what is so obviously true, that *both* land and and labor are sources of weath.'

As Dr. Adam Smith's book will be accessible to most of our readers, we will first, with the aid of the above writer, glance at the main principles which characterise the modern school of political economy, and which are considered improvements on Dr. Smith's theory: then attend to Mr. Mill's exhibition of the 'Elements' of the science; and finally, to its history from the earliest periods, marking its chief eras, after Mr. M'Culloch.

The main principles of the new school are the three following:—

1. That the quantity of labor *worked up* in commodities is the sole regulator of their exchangeable value.

2. That demand and supply have *no* effect on price and value, except in cases of monopoly, and for a short period.

3. That the difficulty of production in regard to land is the regulator of profits, to the *exclusion* of the cause stated by Dr. Smith, namely, the relative abundance and competition of capital.

Certainly, of whatever other elements exchangeable value may be composed, the labor worked up in it must at all times be the most influential. It would indeed be most absurd to compare with it generally, the difference of value occasioned by any other ingredient. This is so obvious as scarcely to require stating. But, though the labor worked up in a commodity is allowed to be beyond comparison the main ingredient of value, if there be really other ingredients, and they are at the same time of such a nature as essentially to encourage or discourage

production, and thus operate powerfully upon the creation or retardation of wealth, it would be inexcusable, from a foolish desire of simplification, not to allow them their due weight.

The author of the Wealth of Nations, in his chapter on the Component Parts of Price (B. i. c. 5), resolves the price of the great mass of commodities in every improved society into the three elements of wages, profits, and rent. And in his next chapter he considers natural price as made up of wages, profits, and rents, at their ordinary and natural rates. There is obviously in every society, as stated by this great writer, an ordinary or natural rate of wages and profits; but it is not the same with rents. On account of the different fertility of different soils in the same country, the portion of the produce of land which is resolvable into rent is extremely various. Sometimes it is a half, a third, or a fourth, and sometimes little or nothing; but if the price of a bushel of corn be the same, whether it be resolvable into more or less rent, rent cannot have much influence in determining its exchangeable value; we must therefore conclude that satisfactory reasons have been given why, in tracing the causes of exchangeable value, rent may be considered as having but a very small effect. Profits, however, are still left, besides wages or labor. And it remains to be considered whether profits do or do not influence, and if they do, to what extent they influence, the exchangeable value of commodities.

In the early periods of society, when labor alone is concerned in production and the returns are immediate, the value of commodities so obtained is determined, as our modern economists allow, by the quantity of labor employed to obtain them. But in all stages of society there are a few commodities which are obtained nearly in the same way.

A stone enclosure, for instance, is built from materials on the spot, and constructed in eight days by fifty laborers at half-a-crown a-day. This enclosure, when completed and fit for use, will, on account of the very small quantity of profits concerned, be worth but little more than the labor employed on upon it, that is, 400 days, or, in money, fifty pounds. Now, if a pipe of wine be worth, when it is first put into the cask, exactly this same money or quantity of labor, but must be kept two years before it is used, and the rate of profits be fifteen per cent., at the expiration of that time, it must be sold at above £65, or its value must be above 520 days instead of 400 days labor, in order that the conditions of its supply may be fulfilled. Thus two commodities have had the same quantity of labor employed upon them, and yet the exchangeable value of one of them exceeds that of the other above thirty per cent., on account of the very different quantity of profits worked up in each. Wine is frequently kept much more than two years. Ships are often five or seven years in building. The final returns for commodities which purchase teas in China, reckoning from the period when the first advances were made, are sometimes delayed not less than two or three years; and the same may be said of wrought cottons sold in India after the raw material had been brought from that quarter of the globe and worked up in England. In short, the conditions of the supply of commodities at the same period in improved countries, with reference to the quantity of profits, are extremely various; but all must be repaid in their value when sold, and though it does not often happen that, in short periods, profits fall considerably, yet in the progress of nations great changes must necessarily occur; and, taking only what really happens, we are disposed to believe that the variations of value arising from profits are in many commodities freqeuntly more than twenty per cent., and that variations of ten or twelve per cent. are common. How then can it be asserted that commodities exchange with each other according to the quantity of labor worked up in them? So far as we can trust this plain view of facts it seems notoriously otherwise.

These authors, however, contend that, 'the profits of stock are only another name for the wages of accumulated labor.' We have always understood wages to mean the remuneration paid for some kind of human exertion; and it is certain that the accumulated labor worked up in machinery, raw materials, or any other species of capital, is just of the same nature as immediate labor, and paid for exactly in the same way: but the profits both upon the accumulated labor and the direct labor are totally a different kind of thing. On this point Adam Smith well observes, 'the profits of stock, it may perhaps be thought, are only a different name for the wages of a particular sort of labor, the labor of inspection and direction. They are, however, altogether different, are regulated by quite different principles, and bear no proportion to the quantity, hardship, and ingenuity, of this supposed labor of inspection and direction.'

But Mr. M'Culloch seems to intimate that he considers the effect of capital employed to keep a cask of wine till it is fit for drinking is to set in motion the agency of nature, or the processes which she carries on in the casks, instead of the agency, or labor of men. (See article Political Economy, *Encyclopædia Britannica, Supplement.*) This, however, is utterly to confound the most obvious distinctions. The assistance of nature to give this kind of improvement to wine is at the command of every one who has capital, and therefore requires no wages; in this case nature gives her labor gratis. This is quite clear, because the increased value which the wine acquires is in no degree proportioned to the efficiency of her workmanship: all wine kept for two years must be paid for at the same price, whether it improved by keeping or not. In no view of the subject, therefore, is there the slightest ground for confounding the profits of stock with the wages of labor: yet, without this strange and most uncalled for misnomer, how is it possible to say that commodities exchange with each other nearly according to the quantity of labor worked up in them. Large concessions and modifications were, in consequence, repeatedly made on this point by Mr. Ricardo, and which, though not sufficient to meet the truth of the case, are sufficient to destroy the assumption that the products of the same quantity of labor

in the same country, always remain the same in value. In the last edition of his work he says, 'It is necessary for me to remark that I have not said, because one commodity has so much labor bestowed upon it as will cost £1000, and another so much as will cost £2000, that, therefore, one would be of the value of £1000 and the other of the value of £2000; but I have said that, their value will be to each other as two to one, and that in these proportions they will be exchanged. It is of no importance to the truth of this doctrine whether one of these commodities sells for £1100 and the other for £2200; or one for £1500 and the other for 3000; into that question I do not at present enquire. I affirm only, that their relative values will be governed by the relative quantities of labor bestowed on their production.'—(c. i. p. 46.)

On this assumption the whole of the calculations and reasonings throughout the remaining part of the work is founded; although, in two sections of the first chapter expressly devoted to the subject, it is allowed, that the principle that the quantity of labor bestowed on commodities regulates their relative value is considerably modified by the employment of machinery, as well as by the unequal rapidity of the returns of capital.

A second new principle of the modern school is, that demand and supply have no influence on price and value, except in cases of monopoly, or for short periods of time.

On this subject Mr. M'Culloch is very decided, having referred to Adam Smith on the general equality of wages and profits, he says, 'the principle of the equality of wages and profits once established, it is easy to show that variations in the demand and supply of commodities can exert no lasting influence on price. It is the cost of production, denominated by Smith and the marquis Garnier necessary or natural price, which is the permanent and ultimate regulator of the exchangeable value or price of every commodity which is not subjected to a monopoly, and which may be indefinitely increased in quality by the application of fresh capital and labor to its production.'

We are willing to allow that the natural prices of commodities are determined by the natural costs of production, according to the meaning of the term, as used by Adam Smith, or even after we have excluded the effects of rents: but, as profits will still remain a component part of price, it is absolutely necessary, before we can exclude demand and supply from a lasting influence on exchangeable value, to show that they can have no influence on the natural rate of profits. Dr. Smith, in using the term natural rate of wages and profits, says, that he means by it 'the ordinary or average rate which is found in every society or neighbourhood, and which is regulated partly by the general circumstances of the society, their riches or poverty; their advancing, stationary, or declining conditions; and partly by the particular nature of each employment.' An average of ten or a dozen years may fairly be considered as sufficient or more than sufficient to determine this ordinary rate of profits. But it is a matter of universal notoriety that, in the progress of a nation towards wealth, considerable fluctuations take place in the rate of profits for ten, twelve, or twenty years together out of 100 or 200; and the question is, to what cause these fluctuations are to be assigned.

And upon this point Mr. Ricardo has established a most useful and important truth, i.e. that profits are determined by the proportion of the whole produce which goes to labor. It is, indeed, a direct corollary from the proposition, that the value of commodities is resolvable into wages and profits; but its simplicity and apparent obviousness do not detract from its utility. It is, however, only one important step in the theory of profits, which cannot be complete till we have ascertained the cause which, under all circumstances, regulates this proportion of the whole produce which goes to labor immediate and accumulated.

Into these we cannot go minutely; but it will be found that the specific reason which occasions a larger or smaller proportion of the produce of a given quantity of labor to go to labor, is the fall or rise in the value of the whole produce of such labor resulting from the temporary or ordinary state of the supply, compared with the demand. If we refer to the value of the whole produce of a given quantity of labor, this proposition is true, whatever may be the variations in the productiveness of labor; but, if we are considering the value of a given quantity of produce as determining profits, we must refer to the state of the demand and supply, while the productiveness of labor remains the same. To take a familiar case: if cottons fall in value from an abundant supply, not occasioned by improved machinery, will not a larger proportion of the produce of the same quantity of accumulated and immediate labor be necessary to repay that labor? and will not a smaller proportion be left for profits, although, instead of an increased demand for labor, the capitalist will neither have the power nor the will to employ so much as before? On the other hand, if cottons rise in value from a diminished supply, not occasioned by the diminished productiveness of labor, will not a smaller proportion of the produce of the same quantity of accumulated and immediate labor go to repay that labor; and will not a larger proportion of the produce be left for profits, although, instead of a diminished demand for labor, the capitalists will have both the power and the will to employ more labor? It appears, therefore, that in these cases of varying profits, it is specifically the varying state of the demand compared with the supply of produce while the productiveness of labor remains the same, which determines them. And it seems to follow that the ordinary state of profits, or the ordinary proportion of the produce which goes to repay the advances of accumulated and immediate labor necessary to obtain it, is determined by the ordinary state of the demand compared with the supply of such produce.

The third important principle which peculiarly distinguishes the new school of political economy is, that the difficulty of production in the case of land is the regulator of profits, to the entire exclusion of the cause stated by Adam

Smith, namely, the relative abundance and competition of capital.

'Dr. Smith,' says Mr. M'Culloch, 'was of opinion that the rate of profit varied inversely as the amount of capital, or, in other words, that it was always greatest where capital was least abundant, and lowest where capital was the most abundant. He supposed that, according as capital increased, the principle of competition would stimulate capitalists to endeavour to encroach on the employment of each other, and that, in furtherance of this object, they would be tempted to offer their goods at a lower price, and to give higher wages to their workmen. This theory was long universally assented to. It has been espoused by MM. Say, Sismondi, and Storch, by the marquis de Garnier, and, with slight modifications, by Mr. Malthus. But, notwithstanding the deference due to these authorities, it is easy to see that the principle of competition could never be productive of a general fall in the rate of profit. Competition will prevent any one individual from obtaining a higher rate of profit than his neighbours; but no one will say that competition diminishes the productiveness of industry, and it is on this that the rate of profit must always depend. The fall of profits, which invariably takes place as society advances, and population becomes denser, is not owing to competition, but to a very different cause—'to a diminution of the power to employ capital with advantage, resulting either from a decrease in the fertility in the soil which must be taken into cultivation in the progress of society, or from an increase of taxation.'

"Here," remarks the Quarterly Reviewer, "the opinion of Adam Smith on the subject of profits is not properly understood. It is quite clear, from the context of the passage referred to, that he never meant to state generally, that the rate of profit varies inversely as the amount of capital, without any reference to the difficulty or facility of finding employment for it, which would be saying that England must have lower profits than Holland, on account of the greater quantity of capital employed in England, or that the rate of profits in any country whose capital was increasing must go on falling regularly, and be always lower at every subsequent period, whether new channels of trade, and more productive means of employing capital, were opened to her or not. What Adam Smith says is this (b. ii. c. iv.), 'As capitals increase in any country the profits which can be made by employing them necessarily diminish. It becomes gradually more and more difficult to find within the country a profitable method of employing any new capital. There arises in consequence a competition between different capitals, the owner of one endeavouring to get possession of that employment which is occupied by another.' This very distinctly implies, not merely absolute amount of capital, but relative difficulty of finding profitable employment for it. Abundance and competition, indeed, always have a relative signification; and, by the abundance and competition of capital, Adam Smith obviously means an increase in the share of the 'annual [illegible] duce, which, as soon as it comes from the ground, or from the hands of the productive laborers, is destined for replacing a capital.' But it is quite certain that, whenever this share increases, profits must fall."

Competition certainly cannot diminish the productiveness of industry; but it does not follow that it is on this that the rate of profit must always depend. 'The rate of profits depends upon the proportion of the whole produce which goes to replace the advances; but this proportion may obviously be the same when the productiveness of industry is very different.' If the prices of calicoes fall, it is quite obvious that, while the workman continues to earn the same money wages, he will obtain a larger proportion of the calicoes produced by him. This does not imply an increased demand for labor, and it is equally certain that it does not imply an increased value of labor. Measured in money, the value of which for short periods is considered as being steady, labor remains of exactly the same value as before, and the additional quantity of calicoes earned by the workman is exclusively owing to the fall in their money price. On the other hand, if, under the same circumstances, calicoes rise in money price, the workman must necessarily earn a smaller proportion of what he produces; but this, so far from implying a decrease in the demand for labor, implies, on the part of the capitalist, both the power and will to employ more than before. Nor does it imply a diminished value of labor. Measured in the steady article of metallic money, labor has continued exactly of the same value; and, though the workman earns a smaller quantity of calicoes, yet this is exclusively owing to the rise in the price of calicoes, while the price of his labor has remained the same. Instances of this kind are occurring all around us every day of our lives; and we believe that there is no political economist who would venture to say, that, in these individual cases, the variations of profits, arising from wages absorbing a greater or smaller proportion of the produce, were occasioned by the rise or fall in the value of the labor, instead of a rise or fall in the value of the produce. But, in reality, the principle is as applicable generally as it is individually, and will be found to be true for periods of considerable length, as well as for those short periods during which we are in the habit of considering metallic money as practically of the same value. If the competition of capital in any particular department of industry may so lower the value of the produce as to occasion a larger proportion of the produce to be paid to the laborer, there seems to be no reason why the competition of increasing capital in all departments should not so lower the value of the mass of commodities, compared with labor, as to award generally a larger proportion of what is divided between the laborers and the capitalists to the laborers, and thus occasion a general fall on profits.

It appears to us that in denying the effects of the relative competition of capital on profits, and referring exclusively to the relative productiveness of labor, the friends of the new school have rejected a principle which will account for

almost every variation of profits which can possibly occur, and have endeavoured to substitute another, which will only account for one class of cases, and those of such a nature that they may not occur in the course of one or two centuries.

On the whole the real difference between the new system and that of Dr. Smith may, we are inclined to think, be still further concentrated; and that it will not be incorrect to state that all the peculiar doctrines of the former directly and necessarily flow from the first of the new principles above adverted to, namely, that the exchangeable value of commodities is determined by the quantity of labor worked up in them. Hence it would follow, directly and necessarily, that neither the demand compared with the supply, nor the relative abundance and competition of capital, can have more than a mere temporary effect on values and profits.

Mr. Mill has produced what he terms 'a school-book of political economy;' professing 'to detach the essential principles of the science from all extraneous topics, to state the propositions clearly and in their logical order, and to subjoin its demonstration to each.' 'I profess,' he adds, 'to have made no discovery.' His work is divided into four classes, devoted respectively to the consideration of production, distribution, interchange, and consumption. Those who are not aware of the degree in which classification has been neglected by able writers on this science, we should recommend to compare the different orders followed by Mr. Ricardo and Mr. Mill. Mr. Ricardo's treatise contains thirty-one chapters. The first and the twentieth are on value; the second, the twenty-fourth, and thirty-first, on rent; the fourth and thirtieth on price; the seventh on foreign trade; the next ten chapters are on taxation (with the exception of one on tithes); the twenty-second and the twenty-fifth take us back to trade; and in the twenty-ninth we are again entangled in the doctrine of taxation. When subjects are discussed in this manner, scrap by scrap, however sound or original the writers' views may be, there is not one reader in twenty who will not be more perplexed than instructed by his work.

While great merit belongs on the whole, as we think, to this work as an elementary treatise, there are some points on which the writer has chosen to rest his cause on the most dubious and circuitous kind of reasoning. We instance the following passage, which contains the grounds on which he assents, and calls for the assent of his readers, to Mr. Malthus's proposition—that the natural tendency of the human species to increase is such as would in a very short space of time double the numbers of any society.

'The females of those species of animals whose period and mode of gestation are similar to those of the female of our own species, and which bring forth one at a birth, are capable, when placed in the most favorable circumstances, of a birth every year, from the time when the power of producing begins till the time when it ends, omitting one year now and then, which, at the most, amounts to a very small proportion on the whole. The suckling of the infant, in the case of the female of the human species, if continued more than three months, has a tendency to postpone the epoch of conception beyond the period of a year. This, it is to be observed, is the only physiological peculiarity which authorises an inference of any difference in the frequency of the births in the case of the female of the human species, and that of those other species to which we have referred. To reason correctly, we should make an allowance for that peculiarity. Let such ample allowance be made as will include all interruptions; let us say that one birth in two years is natural to the female of the human species. In Europe, to which we may at present confine our observations, the period of childbearing in women extends from sixteen or seventeen to forty-five years of age. Let us make still more allowance, and say it extends only from twenty to forty years of age. In that period, at the great allowance of two years to one birth, there is time for ten births, which may be regarded as not more than the number natural to the female of the human species. Under favorable circumstances, the mortality among children is very small. Mortality among the children of very poor people is unavoidable, from want of necessary means of health. Among the children of people in easy circumstances, who know and practise the rules for the preservation of health, the mortality is small; and there can be no doubt, that, under more skilful modes of managing the food, and clothing, and air, and exercise, and education of children, even this mortality would be greatly diminished.

'We may conclude, therefore, that in the most favorable circumstances, ten births are the measure of fecundity in the female of the human species; and that, of the children born, a small proportion would die before the age of maturity. For occasional instances of barrenness, and for this small degree of mortality, let us make much more than the necessary allowance, a deduction of one-half, and say, that every human pair, united at an early age, commanding a full supply of every thing necessary for physical welfare, exempt from the necessity of oppressive labor, and sufficiently skilled to make the best use of their circumstances for preventing disease and mortality among themselves and their children, will, one with another, rear five children. If this is the case, it is needless to exhibit an accurate calculation, to show that population would double itself in some moderate portion of years. It is evident, at once, that it would double itself in a small number of years.' (p. 31—33.)

Mr. Mill fairly admits, at the same time, that 'the statements, respecting the rate of procreation in different countries, will be found to be either suppositions with respect to matters of fact, upon the conformity of which suppositions to any real matters of fact we can have no assurance, or statements of fact of such a nature as prove nothing with regard to the points in dispute.' But see our article POPULATION.

We might question whether Mr. Mill has succeeded in showing, that the propensity towards frugality is too rare and too feeble to permit the rapid accumulation of capital. When we look at the immense accumulation which has taken place in our own country within the last

thirty years, in spite of the enormous amount of loans and taxes which have been consumed in the service of the public, we cannot help suspecting that, so far as the accumulation of capital depends on individual frugality, it would increase much more rapidly than our author allows. We might further suggest that the rate of profit on capital will not necessarily fall, unless the demand for the employment of capital does not keep pace with the increase of its disposable amount; and that even if profits should be lowered, yet a lower rate of profits on a greater amount of capital may produce a larger fund for savings than a higher rate of profit on a less capital. It is therefore clear that Mr. Mill has here trusted to a long line of argument, in which there appear to be many weak points. We should even be disposed to question what he appears to take for granted as self-evident—that the funds applied in the maintenance of labor depend entirely on the amount of the savings. That which is saved may be such that it cannot be employed reproductively with advantage. To be so employed, it must be capable of putting in motion industry which will produce a value greater than its own. Now, what evidence is there, that every thing which is saved is necessarily capable of being immediately employed in the production of something which will be of superior value? And, if all savings are not capable of being immediately so applied, is there not in every stage of society a limit set to the rate of accumulation, totally independent of the propensity of man to lay up in store or to consume?

Savings do not become capital, unless they are employed reproductively; and it is the difficulty of finding modes of so applying them, not the strong inclination of man to spend all that he can obtain, that opposes a bar to the rapid accumulation of capital. Any plan, therefore, of increasing the capital of a country by an artificial diminution of the consumption, proceeds upon a supposition of very dubious truth. You may, by such means, diminish the amount of the unproductive consumption of the country, but you will not necessarily increase its productive consumption. The more probable result will be, either that the amount of annual production will be lessened, or that a proportion of the unproductive consumption will be shifted from one class of commodities to another. We are, therefore, not a little surprised that Mr. Mill should be inclined to look upon sumptuary laws as good in themselves, and to object to them chiefly on the ground of the difficulty of carrying them into effect.

The prosperity of a country depends on two things;—the amount of its annual consumption, and consequently of its annual production, and the greatness of the unproductive consumption in relation to the reproductive. The greater the annual production, and the less the quantity of labor which gives it, the more flourishing is the state of the country. Sumptuary laws, considered in a political, not a moral view, assume, that it is the duty of the legislator to diminish the unproductive consumption; in other words, to diminish that which the happiness of the world requires should be increased. They further assume that to diminish the unproductive consumption is a certain means of increasing the reproductive. To both of these assumptions Mr. Mill, in his doctrine of capital, has paid too much deference.

There is another mode of forcing the accumulation of capital, which Mr. Mill has suggested, and of which he has examined the consequences with more minuteness than it deserves.

'There is certainly one course by which the legislature might produce considerable effects upon the accumulation of capital; because it might lay hold of any portion which it pleased of the net produce of the year, and convert it into capital. We have only, therefore, to enquire in what manner this could be performed, and what effects it would produce. The mode of taking whatever portion it might find expedient is obvious and simple. An income tax of the proper amount would effectually answer the purpose.

'The legislature might employ the capital thus forcibly created in one or other of two ways: it might lend it to be employed by others; or it might retain the employment in its own hands. The simplest mode, perhaps, would be, to lend it to those manufacturers and capitalists who might apply for it, and could give security for the repayment. The interest of what was thus laid out in one year might be employed as capital the next. Every annual portion would thus make compound interest, and, so long as the interest remained pretty high, would double itself in a small number of years. If wages appeared likely to fall, a higher income tax would be required. If wages rose higher than seemed to be necessary for the most desirable condition of the laborer, the income tax might be reduced.'—P. 45, 46.

Our author is far from recommending this plan. But we think that he might have gotten rid of it much more briefly than he does. Government might compel the payment of the tax; but it could not create facilities of employing what was thus forcibly accumulated in the production of commodities of increased value; and, unless such facilities constantly existed, accumulation would be of no avail. It might depress and discourage reproductive industry, but could not promote it.

On the subject of *value* Mr. Mill follows, of course, in the steps of Mr. Ricardo; but on that of the value of *money* he singularly contradicts the sentiments of his school.

'It is not difficult,' he says, 'to perceive that it is the total quantity of the money in any country which determines what portion of that quantity shall exchange for a certain portion of the goods or commodities of that country. If we suppose that all the goods of the country are on one side, all the money on the other, and that they are exchanged at once against one another, it is obvious that one-tenth, or one-hundredth, or any other part of the goods, will exchange against one-tenth, or any part of the whole of the money; and that this tenth, &c., will be a great quantity or small, exactly in proportion as the whole quantity of the money in the country is great or small. If this were the state of the facts, therefore, it is evident

that the value of money would depend wholly upon the quantity of it.

'It will appear that the case is precisely the same in the actual state of the facts. The whole of the goods of a country are not exchanged at once against the whole of the money; the goods are exchanged in portions, often in very small portions, and at different times, during the course of the whole year. The same piece of money which is paid in one exchange to-day may be paid in another exchange to-morrow. Some of the pieces will be employed in a great many exchanges, some in very few, and some, which happen to be hoarded, in none at all. There will, amid all these varieties, be a certain average number of exchanges, the same which, if all the pieces had performed an equal number, would have been performed by each; that average we may suppose to be any number we please; say, for example, ten. If each of the pieces of the money in the country perform ten purchases, that is exactly the same thing as if all the pieces were multiplied by ten, and performed only one purchase each. The value of all the goods in the country is equal to ten times the value of all the money; as each piece of the money is equal in value to that which it exchanges for, and as it performs ten different exchanges in a year.'

He was bound to have maintained, that the value of money is regulated by the quantity of labor employed in producing it. It is perhaps of more importance to remark that he has not proved the principle on which he proceeds. He supposes the whole of the money in the country (or, if each piece of money performs ten exchanges, ten times the whole of the money) to be equal in value to the whole of the commodities in it: and from this supposition it will doubtless follow that, other things remaining the same, the value of money will vary inversely as its quantity. The truth of the doctrine, however, depends entirely on the accordance of the supposition with fact; and that accordance is by no means self-evident. On the subject of the rate of profit, Mr. Mill has given a clear exposition of the doctrine of Mr. Ricardo.

Wherever he treats of capital or profits we think this writer most deficient; generally, and especially in the chapter on interchange, his reasonings are both perspicuous and concise. His work is one from which even he who has made considerable proficiency in the science may learn much. It will assist him in methodising his opinions; it will point out to him connexions which hitherto have probably escaped his notice; it will aid him in bringing his notions in complete review before the mind, and in taking from time to time a comprehensive survey of the science. To those who are unimbued with the principles of political economy, Mr. Mill's Elements present great facilities for the acquisition of valuable knowledge.

The history of the science is brief but interesting. It is to be dated from the publication of Dr. Smith's Wealth of Nations. 'If he has not left us a perfect work,' says Mr. M'Culloch, 'he has, at all events, left us one which contains a greater number of useful truths than have ever been given to the world by any other individual; and he has pointed out and smoothed the route, by following which, subsequent philosophers have been enabled to perfect much that he had left incomplete, to rectify the mistakes into which he had fallen, and to make many new and important discoveries. Whether, indeed, we refer to the soundness of its leading doctrines, to the liberality and universal applicability of its practical conclusions, or to the powerful and beneficial influence it has had on the progress and perfection of economical science, and still more on the policy and conduct of nations, Dr. Smith's work must be placed in the foremost rank of those that have helped to liberalise, enlighten, and enrich mankind.'

This writer ranks Mr. Malthus's Essay on the Principle of Population, published in 1798, as the next great contribution to the science subsequently to the publication of the Wealth of Nations. 'The fact,' he says, 'that the population of every country has a natural and constant tendency not only to rise to the level of the mean of subsistence, but to exceed them, had been frequently observed by previous writers, and had been strikingly illustrated by Mr. Townsend, in his Dissertation on the Poor Laws, published in 1786. But, though not the original discoverer of the principle of population, Mr. Malthus was certainly the first to establish it on a secure foundation [whether he has done this, by the way, we wholly doubt], and to show its vast consequence to a right understanding of almost all the great questions connected with the essential interests of society; and especially of those respecting the governing causes of the rate of wages and the condition of the poor. He has demonstrated, by an extensive and careful examination of the state of population in different countries, and in every stage of society, that an increase in the means of subsistence is the only sure criterion of a real, and permanent, and beneficial increase in the numbers of any people.'

'The Traité d'Economie Politique of M. J. B. Say of Paris, the first edition of which appeared in 1802, would deserve,' adds our author, 'to be respectfully mentioned in a sketch of the progress of political economy, were it for nothing else than the effect that his well digested and luminous exposition of the principles of Dr. Smith has had in accelerating the progress of the science on the continent. But in addition to the great and unquestionable merit that it possesses from its clear and logical arrangement, and the felicity of many of its illustrations, 'it is enriched with several accurate, original, and profound discussions.'—Preface to Mr. Ricardo's Principles of Political Economy. Of these, the explanation of the real nature and causes of gluts is decidedly the most important and valuable. M. Say has shown that no conceivable increase of the powers of production can ever occasion a general glut, or overloading of the market. Too much of one commodity may occasionally be produced; but it is quite impossible, he contends, there can be too great a supply of every species.

In 1815 the real nature, origin, and causes of rent were ably treated in two pamphlets, pub-

lished nearly at the same moment, by A Fellow of University College, Oxford, and Mr. Malthus. But the appearance of Mr. Ricardo's work on the Principles of Political Economy and Taxation, in 1817, is regarded as forming a new and memorable era in the history of the science. Exclusive of correlative discussions, Mr. Ricardo has here analysed the principles which determine the exchangeable value of commodities, and has given a full view of the science of the distribution of wealth.

The fundamental principle maintained by Mr. Ricardo, 'that the exchangeable value, or relative worth of commodities, as compared with each other, depends exclusively on the quantities of labor necessarily required to produce them,' we have discussed to the full extent of our limits.

Among the subsequent contributors to the elucidation of this science, we may mention Mrs. Marcet, who, in her Conversations on Political Economy, has illustrated and explained the elementary and leading principles, established by Dr. Smith, Mr. Ricardo, and others, with much ingenuity. 'Mr. Mill's Elements of Political Economy is a work of a higher order,' says Mr. M'Culloch, 'and is, perhaps, better calculated for the use of those who are considerably advanced in the science than of beginners. Mr. Mill touches on almost every topic of discussion: he has disentangled and simplified the most complex and difficult questions; has placed the various principles which compose the science in their natural order; and has shown their connexion with and dependence on each other. Mr. Mill's object being only to give a strictly logical deduction of the principles of Political Economy, he has not attempted to illustrate his doctrines by references either to past or present circumstances or institutions; and, though his work may on that account be less generally interesting, it is so much the better calculated to fix the connexion of the great truths of the science in the mind of those who have already studied them in detail.' See also this writer's own able Discourse on Political Economy, 8vo. Edin. 1825.

POLITY, or POLICY, denotes the peculiar form and constitution of the government of any state or nation; or the laws, orders, and regulations, relating thereto. (See GOVERNMENT). Polity differs from politics only, as the theory from the practice of an art.

POLL, *n. s.* & *v. a.*, POL'LARD, POL'LENGER, POLL'ER. } Belg. *polle. pol*, the top; Sax. pol and col, The head; a register of heads or persons: to poll is to take such a register for election or other purposes; to lop off the top of trees, horns of sheep, hair of the human head, &c.; to mow; crop; plunder: a pollard is a tree lopped; clipped coin: pollenger is brush-wood: a poller, a robber; plunderer.

Neither shall they shave, only *poll* their heads. *Ezekiel.*

Lop for the fewel old *pollenger* grown,
That hinder the corne or the grasse to be mown.
Tusser.

Take and exact upon them the wild exactions, coignie, livery, and sorehon, by which they *poll* and utterly undo the poor tenants. *Spenser on Ireland.*

Look if the withered elder hath not his *poll* clawed like a parrot. *Shakspeare. Henry IV.*

Have you a catalogue
Of all the voices that we have procured
Set down by the *poll*? *Id. Coriolanus.*

The muster file, rotten and sound, amounts not to fifteen thousand *poll*. *Shakspeare.*

He'll go and sowle the porter of Rome gates by the ears: he will mow down all before him, and leave his passage *polled*. *Id.*

The oft cutting and *polling* of hedges conduces much to their lasting. *Bacon's Natural History.*

He told the people that subsidies were not to be granted nor levied for wars in Scotland; for that the law had provided another course by service of escuage, much less when war was made but a pretence to *poll* and pill the people. *Bacon.*

Nothing procureth the lasting of trees so much as often cutting; and we see all overgrown trees are *pollards* or dottards, and not trees at their full height. *Id.*

The *poller* and exacter of fees justifies the resemblance of the courts of justice to the bush, whereunto while the sheep flies for defence, he loses part of the fleece. *Id. Essays.*

The same king called in certain counterfeit pieces coined by the French, called *pollards*, crocars and rosaries. *Camden.*

May thy woods oft *polled*, yet ever wear
A green, and, when she list, a golden hair.
Donne.

Who ever brought to his rich daughter's bed,
The man that *polled* but twelve pence for his head?
Dryden.

Polled sheep, that is sheep without horns, are reckoned the best breeders, because the ewes yean the *polled* with the least danger. *Mortimer.*

In solemn conclave sit, devoid of thought,
And *poll* for points of faith his trusty vote.
Tickel.

POLL MONEY, or CAPITATION, a tax imposed by authority on the person or head; either on all indifferently, or according to some known mark or distinction, as quality, calling, &c. Thus, by the statute 18 Car. II. every subject in the kingdom was assessed by the head, or poll, according to his degree; every duke £100, marquis £80, baronet £30, knight £20, esquire £10, &c., and every single private person 12*d*. This was no new tax, as appears by former acts of parliament.

POLLACHIUS, or POLLACK, in ichthyology See GADUS.

POLLARD, or crocard, a sort of base money current in Ireland in the time of Edward I. See *Simon's Hist. of Irish Coins*, p. 15.

POLLARDS, in rural economy, a kind of coarse wheaten flour; one degree finer than the bran.

POLLEN, in botany, the fecundating or fertilizing dust contained within the antheræ or tops of the stamina, and dispersed upon the female organ when ripe for the purposes of impr[illegible]tion. See BOTANY. This dust, corresp[illegible] to the seminal fluid in animals, is comn[illegible] a yellow color; and is very conspicuous in the summits of some flowers, as the tulip and lily. Its particles are very minute, and of extreme hardness. Examined by the microscope, they are generally found to assume some determinate form, which often predominates, not only through all the species of a particular genus, but also through the genera of a natural family or order.

This powder being triturated, and otherwise prepared in the stomach of bees, by whom great quantities are collected in the hairy brushes with which their legs are covered, is supposed by some authors to produce the substance known by the name of wax; a species of vegetable oil, rendered concrete by the presence of an acid, which must be removed before the substance can be rendered fluid.

The pollen of the date seems, from the experiments of Fourcroy and Vauquelin, to approach in its constitution to animal substances; that of hazel-nut contains tannin, resin, much gluten, and a little fibrin; and that of the tulip yielded to Grotthus the following constituents in twenty-six parts:

Vegetable albumen . . .	20·25
Malate of lime, with trace of malate of magnesia . . .	3·50
Malic acid	1·00
Malate of ammonia . . . Coloring matter . . . . Saltpetre?	1·25
	26·00

POLLENIN. The principle in pollen, intermediate between gluten and albumen, has been named by Dr. John pollenin. It is yellow, without taste and smell; insoluble in water, alcohol, ether, fat, and volatile oils, and petroleum. It burns with flame. On exposure to air it assumes the smell and taste of cheese, and soon becomes putrid with disengagement of ammonia.

POLLENTIA, a town or colony of Roman citizens in the Balearis Major. It is now said to be Alcudia, situated on the north-east side of the Island Majorca.

POLLENTIA, a town of the Picenum, likewise a colony. It is thought to be either the same with, or near to the Urbs Salvia, but is now extinct.

POLLENTIA, a town of Liguria, at the confluence of the Stura and Tanarus. Suetonius calls it a municipium, and the people Pollentina Plebs. It was famous for its abundance of black fleeces; but was afterwards, under Arcadius and Honorius, stained with a defeat rather of the Romans under Stillico than of the Goths under Alaricus, though palliated by Claudian the poet; after which Rome was taken and set on fire. It is now called Solenza, in the late Piedmont, near Asti.

PO'LLEVIL, *n. s.* Poll and evil.

Pollevil is a large swelling, inflammation, or imposthume in the horse's poll or mane of the neck, just between the ears towards the mane.
Farrier's Dictionary.

POLLEX, in anatomy, the thumb or great toe, according as manûs or pedis is added to it.

POLLEXFEN (Sir Henry), a celebrated English lawyer and judge under Charles II., was born in Devonshire. In 1688 he sat as one of the members for Exeter, and was retained as counsel for the bishops. After the revolution he was appointed chief-justice of the common pleas; but held this office only a very short time, dying in 1692. His Arguments and Reports were published in 1702 in folio. Burnet gives him a character still exemplified, both on the bench and at the bar, that of 'an *honest* and *learned* but perplexed lawyer.'

POLLIA, in botany, the name given by Mr. Lee to the plant called by others

POLLICHIA, a genus of the monogynia order, belonging to the monandria class of plants; and in the natural method ranking with those that are doubtful. Of this there is only one species, viz. P. campestris, or whorl-leaved pollichia, a native of the Cape of Good Hope, which flowers in September.

POLLICIS PRESSIO, and POLLICIS VERSIO were used at the combats of gladiators as signals of life or death to the vanquished combatant; or to the victor to spare or take the life of his antagonist. The pollicis pressio, by which the people granted life to the prostrate gladiator, was no more than a clenching of the fingers of both hands together, and so holding the two thumbs upright close together. The pollicis versio which authorised the victor to kill the other as a coward was the bending back of the thumbs. Such is Dacier's opinion; but others say the pollicis pressio was when the people held up one hand with the thumb bent, and the pollicis versio when they showed the hand with the thumb raised. Authors, however, are not perfectly agreed, though the phrases pollicem premere, and pollicem vertere, frequently occur in the Latin classics.

POLLIO (Caius Asinius), a celebrated Latin poet and orator, was of consular dignity, and composed some tragedies which were esteemed, but are now lost. He was the first who opened at Rome a library for the use of the public. He died at Frescati, aged eighty.

POLLIO, a friend of Augustus, who used to feed his fishes with human flesh. This cruelty was discovered when one of his servants broke a glass in the presence of Augustus, who had been invited to a feast. The master ordered the servant to be seized, but he threw himself at the feet of the emperor, and begged him to interfere, and not to suffer him to be devoured by fishes. Upon this the causes of his apprehension were examined; and Augustus, astonished at the barbarity of his favorite, caused the servant to be dismissed, all the fish-ponds to be filled up, and the crystal glasses of Pollio to be broken to pieces.

POLLISELLA, or POLLICELLA, called anciently Vallis Poenina, a valley of Italy, between the Adige and the Baltena, in the department of the Mincio, district and late territory of Verona; containing thirty-eight parishes, in 1797. It abounds in meadows, black cattle, sheep, and vines.

PO'LLOCK, *n. s.* Lat. *acellus niger.* A kind of fish. See POLLAC.

The coast is plentifully stored with shellfish, sea-hedgehogs, scallops; pilchard, herring, and *pollock.*
Carew.

POLLUTE', *v. n.* }
POLLU'TER, *n. s.* }
POLLU'TION. }
Fr. *polluer;* Lat. *polluo.* To make unclean, in a religious sense; to defile; taint; corrupt: a polluter is he who defiles or corrupts: pollution, the act of doing so; or state induced.

Hot and peevish vows
Are *polluted* offerings, more abhorred
Than spotted livers in the sacrifice.
Shakspeare.

She wooes the gentle air
To hide her guilty front with innocent show,
And on her naked shame,
Pollute with sinful blame,
The saintly veil of maiden white to throw.
Milton.

Polluted from the end of his creation. *Id.*

Envy you my praise, and would destroy
With grief my pleasures, and *pollute* my joy?
Dryden.

Ev'n he, the king of men,
Fell at his threshold, and the spoils of Troy
The foul *polluters* of his bed enjoy. *Id. Æneid.*

The contrary to consecration is *pollution*, which happens in churches by homicide, and burying an excommunicated person in the church. *Ayliffe.*

POLLUTION, in general, signifies the rendering a person or place unclean or unholy. For the Jewish pollutions, see IMPURITY. The Romanists hold a church to be polluted by the effusion of blood or of seed therein; and that it must be consecrated anew. And the Indians are so superstitious on this head, that they break all the vessels which those of another religion have drunk out of, or even only touched; and drain all the water out of a pond in which a stranger has bathed.

POLLUX. See CASTOR AND POLLUX.

POLLUX, in astronomy, a fixed star of the second magnitude in the constellation Gemini, or the Twins. See CASTOR.

POLLUX, CASTOR AND, a fiery meteor. See CASTOR AND POLLUX.

POLLUX (Julius), an ancient Greek writer, who was born at Naucrates, in Egypt, and flourished under Commodus. He was educated under the Sophists, and made great progress in grammatical and critical learning. He taught rhetoric at Athens, and became so famous that he was made preceptor to Commodus. He drew up for his use an Onomasticon or Greek Vocabulary, divided into ten books. It is extant, and contains a vast variety of synonymous words and phrases, ranged under the general classes of things. It was intended to facilitate the knowledge of the Greek language to the young prince; and it is still very useful to all who wish to be perfect in it. The first edition was printed at Venice by Aldus in 1502, and a Latin version was afterwards made and published with it: but there was no correct and handsome edition till that of Amsterdam, in 1706, in folio, by Lederlinus and Hemsterhusius. Lederlinus went through the first seven books, correcting the text and version, and subjoining his own, with the notes of Salmasius, Is. Vossius, Valesius, and of Kuhnius, whose scholar he had been, and whom he succeeded in the professorship of the oriental languages in the university of Strasburg. Hemsterhusius continued the same method through the last three books. Pollux wrote many other things, none of which remain. He died aged fifty-eight.

POLO (Marco), a famous traveller of the thirteenth century, son of Nicolas Polo, a Venetian merchant. Accompanied by his brother Matthew, Nicholas had penetrated to the court of Kublai, the khan of the Tartars, when this prince, highly entertained with their account of Europe, made them his ambassadors to the pope. They now therefore proceeded to Rome, and, having obtained a couple of missionaries, visited Tartary, accompanied by the young Marco. He was employed by the sultan on various embassies, until, after a residence of seventeen years, the three Venetians returned with immense wealth to their own country, in 1295. Marco afterwards served his country at sea, and, being taken prisoner by the Genoese, remained many years in confinement, which he beguiled by composing the history of the travels. The first edition appeared at Venice in 1496, 8vo. It has been translated into various languages, the best versions are in Latin, Cologne, 1671, and in French, published at the Hague in 1675, in 2 vols. Polo not only gave a better account of China than any previous one, but likewise furnished an account of Japan, of several islands in the East Indies, of Madagascar, and of the coast of Africa. The period of his death is not known.

POLTAVA, a town and government of Russia, on the Vorskla. The town is indifferently built, but the streets are wide and straight, and in the centre is a very good square, with a granite monument in honor of Peter the Great. It carries on an active traffic, chiefly in cattle, with Siberia, Germany, the Crimea, and Constantinople. They also export flax, hemp, corn, and wax, at the four yearly fairs. Gardens in the environs produce a large quantity of cherries and other fruit. Here is a regular earthen fortress, which was besieged in 1709 by Charles XII., between whom and Peter I. on the 8th of July, was fought the well known battle of Poltava, in which the Swedes were completely defeated. 737 miles south by east of Petersburg, and 459 S. S. W. of Moscow.

The province is situated between the governments of Cherson and Charkov, extending from 48° 30′ to 50° 75′ of N. lat. Its area is about 16,000 square miles. The soil is rich and strong, yielding, to an extremely imperfect cultivation, heavy crops. The pasturage is also rich; and the horses, though small, are active, and in considerable repute. The manufactures and trade are very limited. Population 1,500,000. The rivers are numerous; but, with the exception of the Dnieper, are navigable only by small boats. The exports are corn, cattle, linen, lime, charcoal, pitch, and potash.

POLTRON', *n. s.* Lat. *pollice truncato*, from the thumb cut off; it being an old practice of cowards to cut off their thumbs, that they might not be compelled to serve in war.—Saumaise. Menage and Minsheu derive it from the Italian *poltro*, a bed; as cowards feign themselves sick: others derive it from *poletro* or *poltro*, a young unbroken horse. Fr. Span. and Ital. *poltrone* is an idle wench. A coward; a nidgit; a scoundrel.

Patience is for *poltroons*. *Shakspeare.*

They that are bruised with wood or fists,
And think one beating may for once
Suffice, are cowards and *poltroons*. *Hudibras*

For who, but a *poltroon* possessed with fear,
Such haughty insolence can tamely bear?
Dryden.

POLYADELPHIA, from πολυς, many, and αδελφια, brotherhood, many brotherhoods, the eighteenth class in Linnæus's sexual system, consisting of plants with hermaphrodite flowers, in which several stamina or male organs are united by their filaments into three or more distinct bundles. See BOTANY, Index.

POLYÆNUS (Julius), the author of some Greek epigrams, extant in the first book of the Anthologia.

POLYÆNUS, the author of eight books of the Stratagems of Illustrious Commanders in War. He was probably a Macedonian, and perhaps a soldier in the early part of his life. He was undoubtedly a rhetorician and a pleader of causes; and appears, from the dedication of his work to the emperors Antoninus and Verus, to have lived towards the end of the second century. The Stratagemata were published in Greek by Isaac Casaubon, with notes, in 1589, 12mo.; but no good edition of them appeared till that of Leyden, 1690, in 8vo. The title-page runs thus:—Polyæni Stratagematum libri octo, Justo Vulteio Interprete; Pancratius Maasvicius recensuit; Isaacus Casaubonus necnon suas notas adjecit.

POLYANDRIA, from πολυς, many, and ανηρ, a man or husband, many husbands, the thirteenth class in Linnæus's sexual method, consisting of plants with hermaphrodite flowers, furnished with several stamina, that are inserted into the common receptacle of the flower. See BOTANY, Index.

POLYANTHEA, a collection of commonplaces in alphabetical order, for the use of orators, preachers, &c. The word is formed from the Greek πολυς, much, and ανθος, flower; and has much the same meaning with anthology or florilege. The first author of the polyanthea was Dominic Nanni de Mirabellio, whose labor nas been improved on by Barth. Amantius, and Franc. Torsius; and since these by Jos. Langius, under the title of Polyanthea Nova, 1613.

POLYANTHES, the tuberose, a genus of the monogynia order, hexandria class of plants; natural order tenth, coronariæ. The corolla is funnel-shaped, incurvated, and equal; the filaments are inserted into the throat of the corolla; in the bottom of which the germen is situated. There is but one species, consisting of some varieties; all of which, being exotics of tender quality, require the aid of artificial heat, under the shelter of frames and glasses, &c., to bring them to flower in perfection in this country. It has an oblong, bulb-like, tuberous, white root; crowned with a few long very narrow leaves; amidst them an upright, straight, firm stem, three or four feet high, terminated by a long spike of large white flowers arranged alternately. The varieties are the common tuberose, with single flowers, double-flowered, dwarf-stalked, and variegated-leaved. They all flower here in June, July, and August; the flowers are funnel or bell-shaped, and garnish the upper part of the stem in a long spike, consisting of from ten to twenty or more separate in alternate arrangements. The common single-flowered tuberose is the sort most commonly cultivated, as it generally blows the most freely, and possesses the finest fragrance. The double-flowered kind also highly merits culture, as when it blows fair it makes a singularly fine appearance. The dwarf and the variegated kinds are inferior to the other two. All the varieties being exotics from warm countries, although they flower in great perfection in our gardens by hot-beds, they will not prosper in the open ground, and do not increase freely in England; so that a supply of the roots is imported annually from Italy, arriving in February or March for the ensuing summer's bloom. The largest are preferred; for on this depends the having a complete blow. They are planted in pots, and plunged in a hot-bed, under a deep frame with glass-lights; or placed in a hot-house, where they may be blowed to great perfection. The principal season for planting them is March and April: in order to continue a long succession of the bloom, make two or three different plantings, at about a month interval; in March, April, and May, whereby the blow may be continued from June until September. The propagation is principally by offsets of the roots. Plant them in March either in a bed of light dry earth in the full ground; or, allow them a moderate hot-bed; and in either method indulge them with a shelter in cold weather, either of a frame and lights, or arched with hoops and occasionally matted; but let them enjoy the full air in all mild weather, giving also plenty of water in dry weather during their growth. Let them grow till their leaves decay in autumn: then take them up, clean them from earth, and lay them in sand till spring; when such roots as are large enough to blow may be planted and managed as already directed, and the smaller roots planted again in a nursery bed, to have another year's growth; afterwards plant them for flowering. The Egyptians put the flowers of tuberose into sweet oil; and by these means give it a most excellent flavor, scarcely inferior to oil of jasmine.

POLYANTHOS, or POLYANTHUS, a term in botany.

POLYANTHUS, *n. s.* Gr. πολυς, a prefix in the composition of many words, derived from the Greek, and intimating multitude; and ανθος, a flower. A plant.

The daisy, primrose, violet darkly blue,
And *polyanthus* of unnumbered dyes. *Thomson.*

POLYANUS, a mountain of Macedonia, near Pindus.—Strabo.

POLYBIDAS, a Spartan general, who commanded after the death of Agesipolis. He reduced Olynthus.

POLYBIUS, in fabulous history, king of Corinth, a son of Mercury and Chthonophyle, the daughter of king Sicyon. He married Peribœa, who having no sons, they adopted Oedipus, when found in the woods. His daughter Lysianassa was married to Talus, son of Bias, king of Argos; by whom she had Adrastus, who succeeded his grandfather, Polybius.—Paus. Apollod.

POLYBIUS, a famous Greek historian, born at Megalopolis, in Arcadia, 205 B.C. He was the son of Lycortas, chief of the republic of the

Achæans, and trained to arms under the celebrated Philopœmen, whose urn he carried in the funeral procession of that general. He arose to considerable honors in his own country, but was compelled to visit Rome with other principal Achæans, who were detained there as hostages for the submission of their state. Hence he became intimate with Scipio Africanus Æmilianus, and was present with him at the demolition of Carthage. He saw Corinth also plundered by Mummius, and thence passing through the cities of Achaia reconciled them to Rome. He extended his travels into Egypt, France, and Spain, that he might avoid such geographical errors as he has censured in others. It was in Rome that he composed his excellent history, for the sake of which his travels were undertaken. This history was divided into forty books; but there only remain the five first, with extracts of some parts of the others. It has had several editions in Greek and Latin; and there is an English translation by Mr. Hampton. He lived to the age of eighty-two.

POLYBOTES, in fabulous history, one of the giants who warred against Jupiter. Neptune crushed him under the island Coos, as he was walking across the Ægean Sea.—Paus. i. 2.

POLYCARP, one of the most ancient fathers of the Christian church, was born towards the end of the reign of Nero, probably at Smyrna; where he was educated at the expense of Calista, a matron distinguished by her piety and charity. He was a disciple of St. John the Evangelist, and conversed with some of the other apostles. Bucolus ordained him a deacon and catechist of his church; and upon his death he succeeded him in the bishopric. The controversy about the observation of Easter arising, Polycarp had a conversation with Anicetus, bishop of Rome, on the subject, which they carried on with calmness, though they differed in opinion. But he showed great zeal against the heresies of Marcion, Valentinus, and Cerinthus. Some think that St. John dedicated his Apocalypse to him, under the title of 'the angel, or messenger, of the Church of Smyrna.' Polycarp governed the church of Smyrna with apostolic purity, till he suffered martyrdom in the seventh year of Marcus Aurelius. He was burnt at a stake on the twenty-third of April A.D. 167, and many miraculous circumstances are said to have happened at the time, to which some modern divines, particularly Dr. Jortin, give credit, while Dr. Middleton and others ridicule them: such as, that the flames divided and formed an arch over his head, without hurting him; that, upon this, the persecutors run him through with a sword; that his body sent forth a most fragrant smell, and that a dove was seen to fly away from the wound, which some took to be his soul! &c. He wrote some homilies and epistles, which are now lost, except that to the Philippians, which contains short precepts and rules of life. St. Jerome informs us, it was even in his time read in the public assemblies of the Asiatic churches. It is singularly useful in proving the authenticity of the books of the New Testament; for he has several passages quoted from Matthew, Luke, the Acts, and most of St. Paul's Epistles; the first Epistle of St. John, and first of Peter. Indeed his whole Epistle consists of phrases and sentiments taken from the New Testament.

POLYCARPON, in botany, a genus of the trigynia order, belonging to the triandria class of plants; natural order twenty-second, caryophylleæ: CAL. pentaphyllous; there are five very small ovate petals: CAPS. unilocular and trivalved.

POLYCASTE, in fabulous history, the youngest daughter of Nestor, and wife of Telemachus.

POLYCHREST, in pharmacy, signifies a medicine that serves for many uses, or that cures many diseases.

POLYCHREST, SAL, a compound salt, made of equal parts of saltpetre and sulphur, deflagrated in a red-hot crucible.

POLYCHROITE, the coloring matter of saffron.

POLYCLETUS, a celebrated statuary of Sicyon, who flourished about A.A.C. 232. He was so eminent that many of the ancients preferred him to Phidias.

POLYCLITUS, an ancient historian of Larissa.—Ælian. xxi. 41.

POLYCNEMUM, in botany, a genus of the monogynia order, belonging to the triandria class of plants; natural order twelfth, holeraceæ: CAL. triphyllous; and there are five calciform petals, with one seed almost naked.

POLYCOTYLEDONES. See BOTANY.

POLYCRATES, tyrant of Samos, is famous for the good fortune which always attended him. He became very powerful; and got possession not only of the neighbouring islands, but also of some cities on the coast of Asia. He had a fleet of 100 ships of war, and was so universally esteemed that Amasis, the king of Egypt, made a treaty of alliance with him. He, however, advised him to chequer his enjoyments, by relinquishing some of his most favorite objects. Polycrates, in compliance, threw into the sea one of his most valuable jewels; but soon after he received as a present a large fish, in whose belly it was found. Amasis no sooner heard this than he gave up all alliance with him, saying that sooner or later his good fortune would vanish. Some time after Polycrates visited Magnesia on the Mæander, whither he had been invited by Orontes the governor, who traitorously put him to death, merely to terminate his prosperity.

POLYCRITUS, an ancient biographer, who wrote the life of Dionysius, tyrant of Sicily.—Diog.

POLYCROTA, in the naval architecture of the ancients, is used to express such of their galleys as had three, four, five, or more tires of rowers, seated at different heights; they were distinguished by this term from the monocrota, or those which had only single rows of oars. The number of rows of rowers in the polycrote galleys has given occasion to some to suppose those vessels of such a height from the water as is scarcely credible. Commentators are not agreed upon the construction of these vessels.

POLYDAMAS, in fabulous history, was a famous athlete, who imitated Hercules in whatever he did. He killed a lion with his fist, and

it is reported he could stop a chariot with his hand in its most rapid course. He was one day with some of his friends in a cave, when on a sudden a large piece of rock came tumbling down, and, while all fled away, he attempted to receive the falling fragment in his arms. His prodigious strength, however, was insufficient, and he was instantly crushed to pieces under the rock.

POLYDECTES, son of Magnes, was king of the island of Seriphos. He received with great kindness Danae and her son Perseus, who had been exposed on the sea by Acrisius. He took great care of the education of Perseus; but, becoming enamoured of Danae, he removed her from his kingdom, apprehensive of his resentment. He afterwards paid his addresses to Danae; and, being rejected, he attempted to offer her violence. Danae fled to the altar of Minerva for protection; and Dictys, the brother of Polydectes, who had himself saved her from the sea-waters, opposed her ravisher, and armed himself in her defence. At this critical moment Perseus arrived; and with Medusa's head he turned into stones Polydectes, and the associates of his guilt. The crown of Seriphos was given to Dictys, who had shown himself so active in the cause of innocence.

POLYDORA, an island of the Propontis, near Cyzicus.

POLYDORA, in fabulous history, the daughter of Meleager, king of Calydon, who married Protesilaus, and killed herself when she heard of his death.

POLYDORE VIRGIL. See VIRGIL.

POLYDORUS, a son of Priam by Hecuba; or, according to others, by Laothoe, the daughter of Altes, king of Pedasus. Being young and inexperienced, when Troy was besieged by the Greeks, his father removed him to the court of Polymnestor, king of Thrace, to whose care he entrusted the greatest part of his treasures, till his country should be freed from foreign invasion. On the death of Priam, Polymnestor made himself master of the riches which were in his possession; and, to ensure them the better, he murdered the young prince, and threw his body into the sea, where it was found by Hecuba. According to Virgil, his body was buried near the shore by his assassin; and there grew on his grave a myrtle, whose boughs dropped blood, when Æneas, going to Italy, attempted to tear them from the tree.

POLYDORUS, a king of Thebes, the son of Cadmus and Hermione, who married Nycteis, by whom he had Labdacus the father of Laius and grandfather of Oedipus.—Apollod.

POLYDORUS, son of Alcamenes, king of Sparta. He put an end to a war which had lasted twenty years between his subjects and the Messenians: and in his reign the Spartans planted two colonies, one at Crotona, the other at Locri. He was highly respected, yet was assassinated by a villain named Polemarchus.

POLYED'RICAL, *adj.* } Gr. πολυεδρος;
POLYE'DROUS. } Fr. *polyedre*. Having many sides.

The protuberant particles may be spherical, elliptical, cylindrical, *polyhedrical*, and some very irregular; and according to the nature of these, and the situation of the lucid body, the light must be variously affected. *Boyle.*

A tubercle of a pale brown spar had the exterior surface covered with small *polyhedrous* crystals, pellucid with a cast of yellow. *Woodward.*

POLYGALA, milkwort, a genus of the octandria order, and diadelphia class of plants; and in the natural method, ranking under the thirty-third order, lomentaceæ. The calyx is pentaphyllous, with two of its leaflets wing-shaped and colored; the legumen is obcordate and bilocular. There are twenty-four species, of which the most remarkable are—

1. P. senega, seneka, or rattlesnake-wort, grows naturally in most parts of North America. It has a perennial root composed of several fleshy fibres, from which arise three or four branching stalks, which grow erect, garnished with spear-shaped leaves placed alternately. The flowers are produced in loose spikes at the end of the branches; they are small, white, and shaped like those of the common sort. It flowers here in July, but the plants do not produce seeds. The root of this species operates very powerfully; but besides the virtues of a purgative, emetic, and diuretic, it was long recommended as an antidote against the poison of a rattlesnake; but this opinion is now exploded. It still, however, maintains its character in several disorders. Its efficacy in pleurisies is most fully established in Virginia: formerly near fifty out of 100 died of that distemper, but by the happy use of this root hardly three out of that number are now lost. As the seeds seldom succeed, even in the countries where the plant is a native, the best method of propagating it is to procure the plants from America, and plant them in a bed of light earth in a sheltered situation, where they will thrive without any other culture than keeping them free from weeds. But, though the plant will stand out ordinary winters, it will be proper to cover it during that season with old tanners' bark, or other mulch, to keep out the frost.

2. P. vulgaris, common milkwort, is a native of the British heaths and dry pastures. The stalks are about five or six inches long, several arising from the same root: the leaves are firm, smooth, entire, and grow alternate upon the stalks, which are terminated with spikes of flowers, most commonly blue, but often red or white: the calyx consists of five leaves, three of which are small and green, two below, and one above the corolla; the other two intermediate ones are large, oval, flat-colored, veined, and resemble petals, which at length turn greenish, and remain a defence to the seed-vessel; the corolla consists of three petals folded together, and forming a tube: the carina is terminated by a heart-shaped, concave appendage, fringed at the extremity. The root has a bitter taste, and possesses the virtues of the American rattlesnake root. It purges without danger, and is also emetic and diuretic; sometimes operating all the three ways at once. A spoonful of the decoction, made by boiling an ounce of the herb in a pint of water till one-half has exhaled, has been found serviceable in pleurises and fevers, by promoting a diaphoresis and expectoration; and three

spoonfuls of the same, taken once an hour, has proved beneficial in the dropsy and anasarca. It has also been found serviceable in consumptive complaints.

POLYGAMIA, πολυς many, and γαμος marriage. This term, expressing an intercommunication of sexes, is applied by Linnæus, both to plants and flowers. A polygamous plant is that which bears both hermaphrodite flowers and male and female, or both.

POLYGAMIÆ, orders of. See BOTANY.

POLYGAMOUS PLANTS. See BOTANY.

POLYGAMUM, a species of holcus, by some erroneously reckoned a species of panicum. It is a native of Africa, and brought from thence to the West Indies. It agrees with every soil and situation; and in many of the rocky and barren parts of Jamaica, which formerly could not support a goat, may now be seen large herds of cattle, sheep, and horses, in excellent order, and fitted for all the purposes of rural economy or the market, feeding on Guinea grass. It is best propagated by the roots, and planted about three feet asunder. In six months it grows very tall, so as often to be six feet high. At this time horses and cattle are turned in to eat what they please of it; and, while they plough up the surface of the ground with their feet, they shake the ripe seed. The rank grass is afterwards cut down, burned off, and the old stock rooted up and thrown away. The seeds vegetate and throw up a plentiful crop; which with common attention will last many years. For this purpose a Guinea grass pasture requires to be kept clean, and supplied in particular places as may be necessary from time to time. The fields ought to be divided into parks by fences, and the cattle shifted from one enclosure to another occasionally.

POLYG'AMY, *n. s.* } Fr. *polygamie*; Gr. POLYG'AMIST. } πολυγαμια. Plurality of wives: one who holds the lawfulness of polygamy.

He lived to his death in the sin of *polygamy*, without any particular repentance. *Perkins.*

They allow no *polygamy*: they have ordained that none do intermarry or contract, until a month be past from their first interview. *Bacon.*

Christian religion, prohibiting *polygamy*, is more agreeable to the law of nature, that is, the law of God, than Mahometanism that allows it; for one man, as having many wives by law, signifies nothing, unless there were many women to one man in nature also. *Graunt.*

Polygamy is the having more wives than one at once. *Locke.*

POLYGAMY, LAWS RESPECTING. Polygamy is universally deemed unlawful, and even unnatural, throughout all Christian countries. But a plurality of wives was permitted not only among the Hebrews, but also, as Selden observes, among most other ancient nations. The Romans indeed were more severe in their morals, and never practised it, though it was not forbidden among them; and Marc Antony is mentioned as the first who took the liberty of having two wives. From that time it became pretty frequent in the empire till the reigns of Theodosius, Honorius, and Arcadius, who first prohibited it by express law in 393. After this the emperor Valentinian, by an edict, permitted all the subjects of the empire, if they pleased, to marry several wives; nor does it appear, from the ecclesiastical history of those times, that the bishops made any opposition to this introduction of polygamy. In Germany, Holland, and Spain, this offence is differently punished. By a constitution of Charles V. it was a capital crime. By the laws of ancient and modern Sweden it is punished with death. In Scotland it is punished as perjury. In England it is enacted by statute 1 Jac. I. cap. 11, that if any person, being married, do afterwards marry again, the former husband or wife being alive, it is felony, but within the benefit of clergy. The first wife in this case shall not be admitted as an evidence against her husband, because she is the true wife; but the second may, for indeed she is no wife at all; and so vice versâ of a second husband. This act makes an exception to five cases, in which such second marriage, though in the three first it is void, is, however, no felony. 1. Where either party hath continually been abroad for seven years, whether the party in England had notice of the other's being living or not. 2. Where either of the parties hath been absent from the other seven years within this kingdom, and the remaining party hath had no notice of the other's being alive within that time. 3. Where there is a divorce or separation a mensa et thoro by sentence in the ecclesiastical court. 4. Where the first marriage is declared absolutely void by any such sentence, and the parties loosed a vinculo. Or, 5. Where either of the parties was under the age of consent at the time of the first marriage; for in such case the first marriage was voidable by the disagreement of either party, which this second marriage very clearly amounts to. But if at the age of consent the parties had agreed to the marriage, which completes the contract, and is indeed the real marriage, and afterwards one of them should marry again, judge Blackstone apprehends that such second marriage would be within the reason and penalties of the act.

Montesquieu contends that polygamy is physically conformable to the climate of Asia. The season of female beauty precedes that of their reason, and their beauty from its prematurity soon decays. The empire of their charms is short. It is therefore natural, he says, that a man should leave one wife to take another; that he should seek a renovation of those charms that had withered in his possession. 'But are these the real circumstances of polygamy?' asks Mr. Marsden, 'Surely not. It implies the contemporary enjoyment of women in the same predicament; and,' he adds, 'I should consider it as a vice that has its source in the influence of a warm atmosphere upon the passions of men, which, like the cravings of other disordered appetites, make them miscalculate their wants.' Moreover, the climate which expands the desires of the men, and prompts a more unlimited exertion of their faculties, does not inspire their constitutions with proportionate vigor; but, on the contrary, renders them in this respect inferior to the inhabitants of the temperate zone; whilst it equally influences the desires of the opposite sex, without being found to diminish from their capacity of enjoyment. Whence we may infer, that if nature intended one woman only should

be the companion of one man in the colder regions of the earth, it appears also intended, à fortiori, that the same law should be observed in the hotter; inferring nature's design, not from the desires, but from the abilities with which she has endowed mankind. Montesquieu also suggested that the inequality in the comparative numbers of each sex, born in Asia, which is represented to be greatly superior on the female side, may have relation to the law that allows polygamy. But it is replied that there is strong reason for denying the reality of this supposed excess. Marsden asserts that the proportion of the sexes throughout Sumatra does not sensibly differ from that ascertained in Europe; nor could he ever learn, from the inhabitants of the many eastern islands with whom he had an opportunity of conversing, that they were conscious of any material disproportion in this respect.

Major Grant observes that the males and females brought into the world are so nearly on a balance, that only abating for a little excess on the side of the males, in the proportion of about nineteen to eighteen, to make up for the extraordinary exposures of men in war, and at sea: it evidently follows that nature only intends one wife, or one husband, for the same person; since, if they have more, some others must go without any at all. Hence he concludes, that the Christian law, which prohibits polygamy, is agreeable to the law of nature.

It is well known that the poet Milton was an advocate for great latitude in the causes of divorce; but his notions respecting polygamy were not fully understood, until the late publication of his Treatise on Christian Doctrine. He was the advocate of polygamy, as amongst the privileges of the male sex. See our article Milton.

Another of the boldest and most specious modern advocate of polygamy was the late Rev. Mr. Madan, an evangelical clergyman of the church of England, who, in 1780, published a work, under the title of Thelypthora; or, A Treatise on Female Ruin, in its Causes, Effects, Consequences, Prevention, and Remedy, &c., in which he contended that marriage, being simply and wholly an act of personal union (or the actus coitus), adultery is never used in the sacred writings but to denote the defilement of a betrothed or married woman, and to this sense he restricts the use of the term, so that a married man, in his opinion, is no adulterer, if his commerce with the sex be confined to single women, who are under no obligations by espousals or marriage to other men; but, on the other hand, the woman who should dare to have even but one intrigue with any other man besides her husband (let him have as many wives as Solomon), would, ipso facto, be an adultress, and ought, together with her gallant, to be punished with immediate death. This, he boldly states, is the law of God; and on this foundation he limits the privilege of polygamy to the man.

In support of his system, he refers to the polygamous connexions of the patriarchs and saints of the Old Testament, and infers the lawfulness of their practice from the blessings which attended it, the laws which were instituted to regulate and superintend it, &c. He even labors much to reconcile the genius of the evangelical dispensation to an arrangement of this sort; and asserts that there is not one text in the New Testament that hints at the criminality of a polygamous connexion. From St. Paul's direction, that bishops and deacons should have but one wife, he would infer that it was lawful for laymen to have more. Christ, he says, was not the giver of a new law; but the business of marriage, polygamy, &c., had been settled before his appearance in the world, by an authority which could not be revoked. This writer further thinks polygamy advantageous in a civil light, and highly politic in a domestic point of view.

It is due to a work long deteriorated, and now we believe nearly extinct (the Monthly Review), to add, that the best answer to this scheme appeared at the time in that publication. We have only room for a summary of the arguments of the writer:—

'When we reflect,' says he, 'that the primitive institution of marriage limited it to one man and one woman; that this institution was adhered to by Noah and his sons, amidst the degeneracy of the age in which they lived, and in spite of the examples of polygamy, which the accursed race of Cain had introduced; when we consider how very few (comparatively speaking) the examples of this practice were among the faithful; how much it brought its own punishment with it; and how dubious and equivocal those passages are in which it appears to have the sanction of divine approbation; when to these reflections we add another respecting the limited views and temporary nature of the more ancient dispensation and institutions of religion—how often the imperfections, and even vices of the patriarchs, and people of God in old time, are recorded, without any express notification of their criminality—how much is said to be commanded, which our reverence for the holiness of God and his law will only suffer us to suppose was, for wise ends, permitted—how frequently the messengers of God adapted themselves to the genius of the people to whom they were sent, and the circumstances of the times in which they lived; above all, when we consider the purity, equity, and benevolence of the Christian law; the explicit declarations of our Lord, and his apostle St. Paul, respecting the institution of marriage, its design and limitation; when we reflect, too, on the testimony of the most ancient fathers, who could not possibly be ignorant of the general and common practice of the apostolic church; and, finally, when to these considerations we add those which are founded on justice to the female sex, and all the regulations of domestic economy and national policy, we must wholly condemn the revival of polygamy; and thus bear our honest testimony against the leading design of this dangerous and ill-advised publication.'—*Monthly Review*, vol. lxiii. p. 338. Dr. Paley has also a good passage on this subject, Moral Philosphy, vol. i.

POLYGARS, in Hindostan, is a name that has been sometimes given to a predatory race of natives who long inhabited impenetrable woods in various parts of that continent.

Latterly, THE POLYGARS' TERRITORY is a name given to a district in the Southern Carnatic, situated between 10° and 11° of N. lat. To the north it is bounded by Trichinopoly; on the south by Marawas and Madura; on the east it has Tanjore and the sea; and on the west Dindigul.

The polygars are, according to Hamilton, military chieftains of different degrees of power and consequence, who bear a strong affinity to the zemindars of the Northern Circars. Those whose pollams, or estates, are situated on the frontier and jungly part of the country, are represented to have been for the most part leaders of banditti, or freebooters, who, as is not uncommon in Asia, had afterwards been entrusted with the police of the country. Some of them trace their descent from the ancient rajahs, or from those who held high offices of trust under the Hindoo government, and received allowances in land or money for the support of a body of horse and foot on the feudal principle. Other polygars had been renters of districts, or revenue officers, who had revolted in times of public disturbance, and usurped the possession of lands, to which they were constantly adding by successive encroachments, when the ruling power happened to be weak and inefficient. The heads of villages, when favored by the natural strength of the country, frequently assumed the name and character of polygars, and kept up their military retainers and nominal officers of state, exercising in this contracted sphere many of the essential powers of sovereignty.

'The amount of the tribute which they paid to the Soubahdars of the Carnatic was wholly disproportioned to their revenues; but more was constantly extorted by the officers of government under the names of fines and presents, which was a perpetual source of violence and distraction. During the periods of public calamity they retaliated upon the nabob's officers and the peaceable inhabitants of the government villages, those acts of indefinite and oppressive authority, which were committed on themselves. Hence the British government were repeatedly burdened with large armaments to subdue these feudatories, involving heavy disbursements from the public revenue, and severe loss of lives.'

The principal pollams, or polygar estates, are those of Shevagunga, Rammad, Manapara, Madura, and Nattam. The first two were permanently assessed in 1803, at the same time as those of Tinevelly; and the rest were soon afterwards settled in perpetuity. From this period the tribute of the polygars, although increased, has been punctually paid; no blood has been shed, or money expended in military operations against them, and the surrounding districts have enjoyed tranquillity under the revival of the ancient system of village police. This territory is not so well watered, nor in so high a state of cultivation, as Tanjore; but the soil is naturally fertile, and the agriculture improving. There are no rivers of any considerable magnitude; the chief towns are Nattam, Manapar, Veramally, Puducotty, Cottapatam, and Tondi. The district is comprehended in the collectorship of Dindigul.

POL'YGLOT, *adj.* & *n. s.* Fr. *polyglotte*; Gr. πολυγλωττος. Having many languages.

> The *polyglot* or linguist is a learned man. *Howel.*

POLYGLOT, among divines and critics, is chiefly used for a Bible printed in several languages. See BIBLE.

POLYGLOTTUS. See TURDUS.

POLYGNOTUS, a famous painter of Thasos, who flourished about 422 years before the Christian era, and was the son and scholar of Aglaophon. He adorned one of the public porticoes of Athens with his paintings, in which he had represented the most striking events of the Trojan war. The Athenians were so pleased with him that they offered to reward his labors with whatever he pleased to accept, but he declined the offer; and the Amphictyonic council, which was composed of the representatives of the principal cities of Greece, ordered that Polygnotus should be maintained at the public expense wherever he went.

POL'YGON, *n. s.* } Fr. *poligone*; Fr. πολυς,
POLYG'ONAL, *adj.* } and γωνια, an angle. A figure of many angles: multangular.

> He began with a single line; he joined two lines in an angle, and he advanced to triangles and squares, *polygons* and circles. *Watts.*

POLYGON, in geometry, is a figure whose perimeter consists of more than four sides, such are the pentagon, hexagon, heptagon, &c. If the angles be all equal among themselves, the polygon is said to be a regular one; otherwise, it is irregular. Polygons take particular names according to the number of their sides; thus a polygon of three sides is called a trigon, of four sides a tetragon, of five sides a pentagon, of six sides a hexagon, &c.; and a circle may be considered as a polygon of an infinite number of small sides, or as the limit of the polygons.

Polygons have various properties, as, 1. Every polygon may be divided into as many triangles as it has sides. 2. The angles of any polygons taken together, make twice as many right angles, wanting four, as the figure has sides. Thus, if the polygon has five sides, the double of that is ten, from which subtracting four leaves six right angles, or 540 degrees, which is the sum of the five angles of the pentagon. And this property, as well as the former, belongs to both regular and irregular polygons. 3. Every regular polygon may be either inscribed in a circle, or described about it. But not so of their regular ones, except the triangle, and another particular case as in the following property. An equilateral figure inscribed in a circle is always equiangular. But an equiangular figure inscribed in a circle is not always equilateral, but only when the number of sides is odd. For, if the sides be of an even number, then they may either be all equal, or else half of them may be equal, and the other half equal to each other, but different from the former half, the equals being placed alternately. 4. Every polygon, circumscribed about a circle, is equal to a right-angled triangle, of which one leg is the radius of the circle, and the other the perimeter or sum of all the sides of the polygon. Or the polygon is equal to half the rectangle under its perimeter and the radius of its inscribed

circle, or the perpendicular from its centre upon one side of the polygon. Hence, the area of a circle being less than that of its circumscribing polygon, and greater than that of its inscribed polygon, the circle is the limit of the inscribed and circumscribed polygons: in like manner the circumference of the circle is the limit between the perimeters of the said polygons; consequently the circle is equal to a right-angled triangle, having one leg equal to the radius, and the other leg equal to the circumference; and therefore its area is found by multiplying half the circumference by half the diameter. In like manner, the area of any polygon is found by multiplying half its perimeter by the perpendicular demitted from the centre upon one side.

The following table exhibits the most remarkable particulars in all the polygons, up to the dodecagon of twelve sides, viz., the angle at the centre, the angle of the polygon, and the area of the polygon when each side is one.

No. of Sides.	Name of Polygon.	Ang. F. at cent.	Ang. C. of polyg.	Area.
3	Trigon	120°	60°	0·4330127
4	Tetragon	90	90	1·0000000
5	Pentagon	72	108	1·7204774
6	Hexagon	60	120	2·5980762
7	Heptagon	$51\frac{3}{7}$	$128\frac{4}{7}$	3·6339124
8	Octagon	45	135	4·8284271
9	Nonagon	40	140	6·1818242
10	Decagon	36	144	7·6942088
11	Undecagon	$32\frac{8}{11}$	$147\frac{3}{11}$	9·3656399
12	Dodecagon	30	150	11·1961524

To find the area of any regular polygon.—Multiply the square of its side by the tabular area, found on the line of its name in the last column of the table, and the product will be the area. Thus, to find the area of the trigon, or equilateral triangle, whose side is twenty. The square of twenty being 400, multiply the tabular area ·4330127 by 400, and the product 173·20508 will be the area.

$$\begin{array}{r} 0{\cdot}4330127 \\ 400 \\ \hline 173{\cdot}2050800 \end{array}$$

There are several curious algebraical theorems for inscribing polygons in circles, or finding the chord of any proposed part of the circumference, which is the same as angular sections. These kinds of sections, or parts and multiples of arcs, were first treated of by Vieta, as shown in the Introduction to Hutton's Log. page 9, and since pursued by several other mathematicians, in whose works they are usually to be found.

Polygon, in fortification, denotes the figure or perimeter of a fortress, or fortified place. This is either exterior or interior. The *exterior* polygon is the perimeter or figure formed by lines connecting the points of the bastions to one another, quite round the work. And the *interior* polygon is the perimeter or figure formed by lines connecting the centres of the bastions, quite around.

Polygons, Line of, is a line on some sectors, containing the homologous sides of the first nine regular polygons inscribed in the same circle; viz., from an equilateral triangle to a dodecagon.

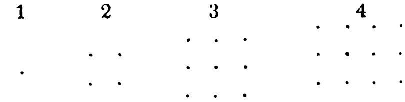
Polygonal Numbers are the continual or successive sums of a rank of any arithmeticals beginning at one, and regularly increasing; and therefore are the first order of figurate numbers: they are called polygonals, because the number of points in them may be arranged in the form of the several polygonal figures in geometry.

The several sorts of polygonal numbers, viz. the triangles, squares, pentagons, hexagons, &c., are formed from the addition of the terms of the arithmetical series, having respectively their common difference 1, 2, 3, 4, &c.; viz., if the common difference of the arithmeticals be one, the sums of their terms will form the triangles; if two, the squares; if three, the pentagons, if four, the hexagons, &c. Thus:—

Arith. progres.	1,	2,	3,	4,	5,	6,	7.
Triang. nos.	1,	3,	6,	10,	15,	21,	28.
Arith. progres.	1,	3,	5,	7,	9,	11,	13.
Square nos.	1,	4,	9,	16,	25,	36,	49.
Arith. progress.	1,	4,	7,	10,	13,	16,	19.
Pentag. nos.	1,	5,	12,	22,	35,	51,	70.
Arith. progres.	1,	5,	9,	13,	17,	21,	25.
Hexagon nos.	1,	6,	15,	28,	45,	66,	91.

The side of a polygonal number is the number of points on each side of the polygonal figure when the points in the number are ranged in that form. And this is also the same as the number of terms of the arithmeticals that are added together in composing the polygonal number; or, in short, it is the number of the term from the beginning. So, in the second or squares,

1 2 3 4



1 4 9 16

the side of the first (1) is 1, that of the second (4) is 2, that of the third (9) is 3, that of the fourth (16) is 4, and so on. And

The angles, or numbers of angles, are the same as those of the figure from which the number takes its name. So the angles of the triangular numbers are three, of the square ones four, of the pentagonals five, of the hexagonals six, and so on. Hence, the angles are two more than the common difference of the arithmetical series from which any rank of polygonals is formed: so the arithmetical series has for its common difference the number 1 or 2 or 3 &c., as follows viz. 1 in the triangles, two in the squares, three in the pentagons, &c; and, in general, if a be the number of angles in the polygon, then $a-2$ is $=d$, the common difference of the arithmetical series, or $d+2=a$, the number of angles.

Prob. I.—*To find any polygonal number proposed;* having given its side n and angles a. The polygonal number being evidently the sum of the arithmetical progression whose number of terms is n and common difference $a-2$, and the sum of an arithmetical progression being equal

to half the product of the extremes by the number of terms, the extremes being 1 and $1 + d.(n-1) = 1 + (a-2).(n-1)$; therefore that number, or this sum, will be $\frac{n^2 d - n \cdot (d-2)}{2}$ $\frac{n^2 (a-2) - n \cdot (a-4)}{2}$, where d is the common difference of the arithmeticals that form the polygonal number, and is always two less than the number of angles a.

Hence, for the several sorts of polygons, any particular number whose side is n will be found from either of these two formulæ, by using for d its values 1, 2, 3, 4, &c.; which gives these following formulæ for the polygonal number in each sort, viz. the

Triangular . . . $\frac{n^2+n}{2}$,

Square . . . . $\frac{2n^2-0n}{2} = n^2$

Pentagonal . . . $\frac{3n^2-n}{2}$,

Hexagonal . . . $\frac{4n^2-2n}{2}$,

Heptagonal . . $\frac{5n^2-3n}{2}$, &c.

Prob. 2.—*To find the sum of any number of polygonal numbers of any order.*—Let the angles of the polygon be a, or the common difference of the arithmeticals that form the polygonals, d; and n the number of terms in the polygonal series, whose sum is sought; then is

$$\left(\frac{n^2-1}{6} d + \frac{n+1}{2}\right) n \text{ or } \left(\frac{n^2-1}{6} \cdot \overline{a-2} + \frac{n+1}{2}\right) n$$

the sum of the n terms sought.

Hence, substituting successively the numbers 1, 2, 3, 4, &c., for d, there are obtained the following particular cases, or formulæ, for the sums of n terms of the several ranks of polygonal numbers, viz. the sum of the

Triangulars . . . $\frac{n^2+3n+2}{6} n$,

Squares . . . . $\frac{2n^2+3n+1}{6} n$,

Pentagonals . . . $\frac{3n^2+3n+0}{6} n$,

Hexagonals . . . $\frac{4n^2+3n-1}{6} n$,

Heptagonals . . . $\frac{5n^2+3n-2}{6} n$.

POLYGONOMETRY is the measure or doctrine of polygons.

POLYGONUM, knot-grass, a genus of the trigynia order, and octandria class of plants; in the natural method ranking under the twelfth order, holoraceæ. There is no calyx: the corolla is quinquepartite, and calycine, or serving instead of a calyx: there is one angulated seed. There are twenty-seven species; the most remarkable are these:—1. P. bistorta, bistort, or greater snakeweed, has a thick oblique intorted root, blackish without and red within; a simple, round, slender stem, nearly two feet high; oval leaves, having decurrent foot-stalks, and the stalk terminated by thick short spikes of whitish-red flowers. See No. 4. The root of a kind of bistort, according to Gmelin, is used in Siberia for ordinary food. This species is by Haller called bistorta foliis ad oram nervosis, and by some other botanists bistorta montana minor. The natives call it mouka; and so indolent are they, that, to save themselves the trouble of digging it out of the earth, they go in spring to pillage the holes of the mountain rats, which they find filled with these roots. In our country bistort is used as a medicine. All the parts of bistort have a rough austere taste, particularly the root, which is one of the strongest of the vegetable astringents. It is employed in all kinds of immoderate hæmorrhagies, and other fluxes, both internally and externally, where astringency is the only indication. It is certainly a very powerful styptic, and is to be looked on simply as such; having no other claim to the sudorific, antipestilential, and other virtues ascribed to it, than in consequence of its astringency, and of the antiseptic power which it has in common with other vegetable styptics. The largest dose of the root in powder is a single dram. 2. P. fagopyrum, buck-wheat, or brank, rises with an upright, smooth, branchy stem, from about a foot and a half to a yard high, heart-shaped sagittated leaves, and the branches terminated by clusters of whitish flowers, succeeded by large angular seeds. This species is angular. It is a sort of corn, and is cultivated both by way of fodder, cutting its stalks while young and green to feed cattle, and for its grain to feed pigeons, poultry, hogs, &c. It flourishes in any soil and situation, but generally thrives best in a light dry earth; the driest seasons seldom retard its growth. 3. P. orientale, commonly called persicaria, has fibrous roots; an upright, robust, strong, jointed stem, rising eight or ten feet high, divided at top into several branches, very large oval lanceolate alternate leaves, on broad foot-stalks half surrounding the stem; and all the branches terminated by long, slender, hanging spikes of reddish-purple heptandrous and digynious flowers, from July till October. This is a most elegant annual for the embellishment of pleasure-grounds; assuming a majestic tree-like growth by its erect luxuriant stem and branchy head; which being garnished with noble large foliage, and numerous pendulous spikes of flowers, in constant succession for three or four months, exhibits a very ornamental appearance from June or July until October, and is so easy of culture that, from its scattered seeds in autumn, young plants rise spontaneously in abundance the ensuing spring, and shoot up so rapidly as to attain six or eight feet in height by July, when they generally begin flowering, and continue till attacked by the frost, when they totally perish; so that a fresh supply must be raised from seed annually. 4. P. viviparum, the smaller bistort, has a thickish root, a simple slender stem half a foot high, spear-shaped leaves, and the stalks and branches terminated by long spikes of whitish-red flowers. Both this and the bistort (No. 1.), flower in May and June, succeeded by ripe seeds in August. They grow wild in England, &c., the first in moist, the other in mountainous situations. They are

perennials, and are propagated by parting the roots in autumn, and are retained in some curious gardens for variety; but their chief merit is for medical purposes: they are powerful astringents, and are used both internally and externally; esteemed very efficacious in hæmorrhagies and other fluxes, and good to heal sore mouths. All the above species are hardy, and thrive in any soil or situation.

POL'YGRAM, *n. s.* Gr. πολυς and γραμμα. A figure consisting of a great number of lines.

POLYG'RAPHY, *n. s.* Gr. πολυς and γραφη; Fr. *polygraphie.* The art of writing in several unusual manners of cyphers; as also deciphering the same.

POLYGRAPHY, POLYGRAPHIA, or POLYGRAPHICE, is formed from the Greek πολυ, much, and γραφη, writing. The ancients seem to have been very little acquainted with this art; nor is there any mark of their having gone beyond the Lacedemonian scytals. Trithemius, Porta, Vigenere, and father Niceron, have written on polygraphy.

POLYGYNIA. See BOTANY.

POLYHALLITE, a mineral in masses of a fibrous texture. Sp. gr. 2·77. Pearly lustre. Its constituents are hydrous sulphate of lime 28·25; anhydrous sulphate 22·42; anhydrous sulphate of magnesia 20·03; sulphate of potassa 27·7; muriate of soda 0·19; red oxide of iron 0·34. It occurs at Ischel in Upper Austria.

POLYHEDRON, in geometry, denotes a body or solid comprehended under many sides or planes.

POLYHEDRON, in optics, is a multiplying-glass or lens, consisting of several plane surfaces disposed into a convex form. See OPTICS.

POLYHISTOR (Alexander), an ancient Grecian historian, born at Miletum about A. A. C. 85. He wrote forty-two books on grammar, history, and philosophy, of which only a few extracts are extant in the works of Pliny and other authors.

POLYHYMNIA, in the Pagan mythology, one of the nine Muses, thus named from πολυς, much, and μνεια, memory. She presided over history, or rather rhetoric; and is represented with a crown of pearls and a white robe; her right hand in action as if haranguing, and holding in her left a caduceus or sceptre, to show her power.

POLYL'OGY, *n. s.* Gr. πολυς and λογος. Talkativeness.

POLYM'ATHY, *n. s.* Gr. πολυς and μανθανω. The knowledge of many arts and sciences; also an acquaintance with many different subjects.

POLYMIGNITE, a new mineral found in the zirconian sienite of Fredrickswärns. It is black, brilliant, and crystallised in small prisms, long, thin, with a rectangle, the edges of which are commonly replaced by one or several planes. Sp. gr. 4·806. It scratches glass, but cannot be scratched by steel. Fracture conchoidal, without indications of cleavage. The surface of the crystals has vivid lustre, almost metallic. The fracture also resembles the surface, possessing a brilliancy far beyond what is common in minerals. At the blow-pipe it suffers no change. With borax it melts easily, and forms a glass colored with iron. With more borax it becomes opaque and of an orange color. Its composition is extraordinary:—

Titanic acid	46·3
Zirconia	14·4
Oxide of iron	12·2
Lime	4·2
Oxide of manganese	2·7
Oxide of cerium	5·0
Yttria	11·5
Traces of magnesia, potash, silica, oxide of tin.	
	96·3

—Berzelius; Annales de Chim. xxxi. 405.

POLYMNESTOR, a king of the Thracian Chersonesus. He married Ilione, Priam's eldest daughter; and, for the sake of the treasure with which he was entrusted by Priam during the siege of Troy, he murdered Polydorus. The fleet in which the victorious Greeks returned, together with their Trojan captives, among whom was Hecuba, stopped on the coasts of Thrace, where one of the female captives discovered the body of Polydorus, whom Polymnestor had thrown into the sea. The dreadful news was communicated to Hecuba his mother, who, to revenge her son's death, called out Polymnestor; when the female captives, rushing on him, put out his eyes with their pins, while Hecuba murdered his two children, who had accompanied him. Euripedes says that the Greeks condemned Polymnestor to be banished into a distant island for his perfidy; but Hyginus relates the story differently, and tells us that, when Polydorus was sent to Thrace, Ilione his sister took him instead of her son Deiphilus, who was of the same age, being afraid of her husband's cruelty. The monarch, unacquainted with the imposition, looked upon Polydorus as his own son, and treated Deiphilus as her brother. After the destruction of Troy, the conquerors wished the house and family of Priam to be extirpated, and therefore offered Electra the daughter of Agamemnon to Polymnestor, if he would destroy Ilione and Polydorus. He accepted the offer, and despatched his own son Deiphilus, whom he took for Polydorus. Polydorus, who passed as the son of Polymnestor, consulted the oracle, and being informed that his father was dead, his mother a captive in the hands of the Greeks, and his country in ruins, he communicated the answer to Ilione, who told him what she had done to save his life, upon which he avenged the perfidy of Polymnestor by putting out his eyes.

POLYMNIA, in botany, a genus of the polygamia necessaria order, and syngenesia class of plants; natural order forty-ninth, compositæ. The receptacle is paleaceous; there is no pappus; the exterior calyx is tetraphyllous, or pentaphyllous; the interior decaphyllous, and composed of concave leaflets.

POLYNESIA is a name given by modern geographers to various groupes of islands in the Great Pacific Ocean, situated east of the Asiatic Islands and AUSTRALASIA (which see), and on both sides the Equator.

Hence they are sometimes divided into Northern and Southern Polynesia. The meridian of 130° E. long. separates these islands from the Asiatic Archipelago; and nearly from the shores of Japan, a line extending to the E. to about 125° of W. long., forms the eastern confines to the fiftieth parallel of S. lat. by which they are bounded on that side. Polynesia thus stretches through an extent of about 5100 miles from north to south, and 3600 from east to west. Besides an indefinite number of detached islands, this space includes the following principal groups:—

North of the Equatorial Line.

1. Pelew Islands,
2. Carolines,
3. Ladrones,
4. Sandwich Islands,
5. Minor Islands,
6. Friendly Islands.

South of the Equatorial Line.

7. Navigator's Islands,
8. Georgian Islands,
9. Society Islands,
10. Marquesas,
11. Washington Islanas,
12. Minor Islands.

Almost all these groupes engage our separate attention in their alphabetical places; but the 'Minor' islands on both sides of the line, and the Georgians will require some notice in this place.

The Minor islands in the *Northern Pacific* may be thus traced:—Commencing on the north-west, we meet with Rica de Plata, Rica de Oro, and the groups called Guadalupa and Malabriga. To the south-east of these are Dicierta, Comitra, Lamira, St. Bartholomeo, Gasper Rico, Brown's Range, Piscadores, Calvert's Islands, St. Pierre, Barbadoes, Pit Isle, Matthew's Island, and Christmas Island. This last was discovered by captain Cook on the 24th of December, 1777. The Russian commander, Von Kotzebue, has also lately disclosed two chains of islands, stretching nearly north and south, situated principally between 6° and 12° of lat., and between 167° and 173° of E. long. from Greenwich. The eastern chain he calls Radack, and the western Ralick. Each of them contains several islands, but present no remarkable features.

The Georgian Islands are a groupe that includes Otaheite, Eimeo, Tapua-manu, and Tetaroa. For an account of the two former see the alphabetical places. About fourteen leagues west of the harbour of Talu, in Otaheite, is Tapua manu, five or six miles long, and rising in the centre to a peak, with a double summit. It abounds with cocoa-nut trees, but the population is small. Within ten leagues of Matavai, and enlosed with a reef of coral rocks, there are a number of low islets, called Tetaroa, belonging to the king of Otaheite, and which supply this island with fish, in exchange for bread-fruit. A conspicuous island, called Maitea, is situated nearly twenty leagues east of Otaheite; and is only a few miles in circumference. Its northern side is too precipitous to be inhabited, but the declivities in the southern part are more gentle, and the country populous, This is enclosed on the east by a coral reef, and is occasionally visited by canoes from Otaheite, which barter for pearls. Society presents a very different aspect, both in these and the Society Islands, from that which it exhibited a few years ago, the labors of the missionaries having resulted in the formal renunciation of idolatry with its superstitious customs and practices in Otaheite, and eight of the other islands. Infanticide has been abolished; the practice of murdering prisoners of war renounced; the suppression of many pernicious amusements effected; and a reception of Christianity avowed. The erection of numerous places for Christian worship, and the establishment of schools, have been the necessary consequences, together with a general observance of the Christian sabbath.

The Minor islands scattered over the *Southern Pacific* are Byron's Island, situated near the equator; St. Augustine's, several degrees south-west of it: north-west of these, Solitary Island; and, between the Equator and the Georgian archipelago, Penrhyn, and some other small rocky islets. There are also several islands on the south side of this group, among which are Hood's, Gloucester, Osnaburg, and High Islands. Further east, and stretching to the American coast, S. J. Baptista, Oparo, Tubouai, and Pitcairn's Islands, with Ducie's Isle, and Easter Island. The most interesting of these are Tubouai, Pitcairn's, and Easter Islands. On Tubouai, the mutineers of the Bounty attempted to form a settlement after they left Otaheite in 1789, but the hostility of the natives compelled them to seek another asylum, which they afterwards found on Pitcairn's Island, which see. See also Easter Island.

The language throughout all the Polynesian Isles is so nearly similar that the natives can easily understand each other; and, in the whole of the dialects spoken from New Zealand to the Marquesas, and from the Sandwich Islands to Easter Island, scarcely a term occurs which, it is said, cannot be found in the various dialects of the Malay language. It is difficult to account for this similarity, unless we suppose all these people to have sprung from the same stock. Yet it is remarkable that the prevailing trade wind, which greatly facilitates the passage westward, renders it so difficult in the direction in which these people are supposed to have spread, that it seems only possible to have been accomplished during the season of the variable winds, when tempests have been known to drive the existing inhabitants so far to sea in their canoes as to render their return impracticable. Thus, in the hands of nature, or rather Nature's Almighty God, to scatter the feathery seed of plants, and rear up the coral rock from the depths of the ocean to receive it; or carry thither the floating waste of an older world, and, finally, man, are operations alike easy—while the storm by which the feeble canoe is driven from all that is dear to its possessors, is made to subserve some mighty plan of Providence, and to spread universal civilisation.

POLYNICES, the son of Œdipus by his mother Jocasta. See Eteocles, Jocasta, and Œdipus.

POLYPETALOUS. See BOTANY.

POLYPHEMUS, *in fabulous history, a celebrated Cyclops, king of all the Cyclops in Sicily,* the son of Neptune and Thoosa the daughter of Phorcys. He was a monster of great strength, very tall, and had but one eye in the middle of the forehead. He ate human flesh, and kept his flocks on the coast of Sicily, where Ulysses, at his return from the Trojan war, was shipwrecked. Ulysses, with twelve of his companions, was seized by the Cyclops, who confined them in his cave, and daily devoured two of them. Ulysses would have shared the same fate, had he not intoxicated the Cyclops, and put out his eye with a firebrand when he was asleep. Polyphemus was awakened by the sudden pain, and stopped the entrance of his cave; but Ulysses escaped, by creeping between the legs of the rams of the Cyclops as they were led to feed on the mountains. Polyphemus became enamoured of Galatæa; but his addresses were disregarded, and the nymph shunned his presence. The Cyclops, when he saw Galatea preferred Acis, crushed his rival with a piece of broken rock.

POLYPHONISM, *n. s.* Gr. πολυς and φωνη, sound. Multiplicity of sound.

The passages relate to the diminishing the sound of his pistol, by the rarity of the air at that great ascent into the atmosphere, and the magnifying the sound by the *polyphonisms* or repercussions of the rocks and caverns. *Derham.*

POLYPODIUM, in botany, male fern, a genus both of the natural and artificial orders of filices, belonging to the cryptogamia class of plants. The fructifications are in roundish points, scattered over the inferior disc of the frons or leaf. There are sixty-five species, of which the most remarkable are these :—

1. P. filix mas, common male fern. This grows in great plenty throughout Britain, in woods and stony uncultivated soils. The greatest part of the root lies horizontally, and has a great number of appendages, close to each other in a vertical direction, while a number of small fibres strike downwards. The leaves are a cubit high, and grow in circular tufts. They are at first alternately pinnate, the pinnæ increasing in size from the base towards the middle, and afterwards gradually decreasing upwards to the summit of the leaf. These pinnæ are again pinnatifid, or subdivided almost to the nerve into obtuse parallel lobes, crenated on the edges. The stalks are covered with brown filmy scales. The fructifications are kidney-shaped, and covered with a permanent scaly brown, surrounded with a saffron-colored elastic ring. This fern has nearly the same qualities, and is used for most of the same intentions, as the pteris aquilina. They are both burnt together for the sake of their ashes, which are purchased by the soap and glass-makers. In the island of Jura are exported annually £150 worth of these ashes. Gunner relates, in his Flor. Noveg., that the young curled leaves, at their first appearance out of the ground, are by some boiled and eaten like asparagus: and that the poorer Norwegians cut off those succulent laminæ, like the nails of the finger at the crown of the root, which are bases of the future stalks, and brew them into beer, adding thereto a third portion of malt, and in times of great scarcity mix the same in their bread. The same author adds that this fern cut green, and dried in the open air, affords not only an excellent litter for cattle, but, infused in hot water, becomes no contemptible fodder to goats, sheep, and other cattle, which will readily eat and sometimes grow fat upon it: a circumstance well worth the attention of the inhabitants of the Highlands and Hebrides, as great numbers of their cattle, in hard winters, frequently perish for want of food. But the anthelmintic quality of the root of the male fern is that for which it is chiefly to be valued. See MEDICINE.

2. P. oreopteris, and 3. thelypteris, are chiefly remarkable because they have been confounded by English botanists with the above species. The oreopteris has a large scaly root, wrapped and tied together with small strong fibres, not to be separated without difficulty. The fructifications are on the margins, both when young and old, and never run into one another: the lobes are oval and plain. It is four times as large as the thelypteris, and grows in dry woods, moors, or hills, and very seldom near water; which characters are widely different from those of the species with which it has been confounded. It is found in England, and very plentifully in Scotland. See Linnæan Transactions, vol. 1. p. 181.

POLYPODY, *n. s.* Lat. *polypodium.* A plant.

Polypody is a capillary plant with oblong jagged leaves, having a middle rib, which joins them to the stalks running through each division. *Miller.*

A kind of *polypody* groweth out of trees, though it windeth not. *Bacon's Natural History.*

POLYPREMUM, in botany, Carolina flax, a genus of the monogynia order, and tetandria class of plants; natural order twenty-second, caryophilleæ: CAL. tetraphyllous. COR. quadrifid and rotaceous, with its lobes obcordate; the capsule compressed, emarginated, and bilocular.

POL'YPUS, *n. s.* } Gr. πολυπης; Fr. *polype.*
POL'YPOUS, *adj.* } Any thing with many roots or feet, as a swelling in the nostrils; a tough concretion of grumous blood in the heart and arteries, &c.: of the nature of a polypus.

If the vessels drive back the blood with too great a force upon the heart, it will produce *polypous* concretions in the ventricles of the heart, especially when its valves are apt to grow rigid. *Arbuthnot.*

The juices of all austere vegetables, which coagulate the spittle, being mixed with blood in the veins, form *polypusses* in the heart. *Id.*

The *polypus* of the nose is said to be an excrescence of flesh, spreading its branches amongst the laminæ of the os ethmoides, and through the cavity of one or both nostrils. *Sharp.*

The *polypus*, from forth his cave
Torn with full force, reluctant beats the wave;
His ragged claws are stuck with stones. *Pope.*

POLYPUS, a species of fresh water insects, belonging to the genus of hydra, of the order of zoophytes, and class of vermes. See ANIMALCULE. The name of hydra was given them by Linnæus on account of the property they have of reproducing themselves when cut in pieces, every part soon becoming a perfect animal. Dr. Hill called them biota, on account of the strong

principle of life with which every part of them is endowed. These animals were first discovered by Leuwenhoek, who gave some account of them in the Philosophical Transactions for 1703; but their wonderful properties were not known till 1740, when Mr. Trembley began to investigate them, or rather till March 1741, when he had satisfied himself that they were real animals. The surprise of Mr. Trembley and others on discovering the true nature of these animals was very great. When Reaumur saw for the first time two polypes formed from one which he had divided into two parts, he could scarcely believe his own eyes; and, even after having repeated the operation 100 times, he said that the sight was by no means familiar to him. On the 18th July, 1741, M. Buffon wrote to Martin Folkes, esq., president of the Royal Society, acquainting him with 'the discovery of a small insect called a polypus, which is found about the common duckweed; and which, being cut in two, puts forth from the upper part a tail, and from the lower end a head, so as to become two animals instead of one. If it be cut into three parts, the middlemost also puts out from one end a head, and from the other a tail, so as to become three distinct animals, all living like the first, and performing the various offices of their species.' In March 1742 Mr. Folkes gave an account of these animals to the Royal Society. They were soon after found in England: after which no further doubt remained concerning their reality. The strange properties recorded of this animal, though very surprising, are, however, none of them peculiar to it alone. The Surinam toad produces its young, not in the ordinary way, but in cells upon its back. Mr. Sherwood has discovered the small eels in sour paste to be without exception full of living young ones. And, as to the most amazing of all its properties, the reproduction of its parts, the crab and lobster, if a leg be broken off, always produce a new one; and Messrs. Bonet, Lyonet, Reaumur, and Folkes, have all found by experiment that several earth and water worms have the same property, some of them even when cut into thirty pieces. The urtica marina, or sea-nettle, has been also found to have the same; and the sea-star fish, of which the polype is truly a species, though it had long escaped the searches of the naturalists, was always well known by the fishermen to have it also. The general character of the polype is, that it fixes itself by its base; is gelatinous, linear, naked, contractile, and can change its place. The mouth, which is placed at one end, is surrounded by hair-like feelers. The young ones grow out from its sides; but in autumn it produces eggs from its sides. There are seven varieties.

1. P. anastaticus, or hydra Anastatica, the clustering polype, forms a group resembling a cluster, or rather an open flower, supported by a stem, which is fixed by its lower extremity to some of the aquatic plants or extraneous bodies in the water; the upper extremity is formed into eight or nine lateral branches, perfectly similar to each other, which have also subordinate branches, whose collective form much resembles that of a leaf. Every one of these assemblages is composed of one principal branch or nerve, which makes the main stem of the cluster an angle somewhat larger than a right one: the smaller lateral branches proceed from both sides of this nerve, and these are shorter the nearer their origin is to the principal branch. There is a polype at the extremity, and others on both sides of the lateral twigs, but at different distances from their extremities. They are all exceedingly small, and bell-shaped, with a quick motion about the mouth, though it is impossible to discern the cause of it. See ANIMALCULE, and PULEX.

2. P. fuscus has frequently eight arms several times longer than the body.

3. P. griseus is of a yellowish color, small towards the bottom, and has generally about seven long arms. The fuscus, griseus, and viridis, are those on which the greatest number of experiments have been made; and their shapes are so various that it is not easy to describe them. They are generally found in ditches. Whoever has carefully examined these when the sun is very powerful, will find many little transparent lumps of the appearance of a jelly, the size of a pea, and flatted upon one side. The same kind of substance is likewise met with on the under side of the leaves of plants which grow in such places. These are the polypes in a quiescent state, and apparently inanimate. They are generally fixed by one end to some solid substance, with a large opening, which is the mouth, at the other; having several arms fixed round it, projecting as rays from the centre. They are slender, pellucid, and formed of a tender substance like the horns of a snail, and capable of contracting themselves into a very small compass, or of extending to a considerable length. The arms are capable of the same contraction and expansion as the body; and with these they lay hold of minute worms and other insects, bringing them to the mouth and swallowing them; the indigestible parts are again thrown out by the mouth. The green polype was that first discovered by Mr. Trembley; and the first appearances of spontaneous motion was perceived by its arms, which it can contract, extend, and twist about in various directions. On the first appearance of danger they contract to such a degree that they appear little bigger than a grain of sand, of a fine green color, the arms disappearing entirely. Soon after he found the griseus, and afterwards the fuscus. The bodies of the viridis and griseus diminish almost insensibly from the anterior to the posterior extremity; but the fuscus is for the most part of an equal size for two-thirds of its length from the anterior to the posterior extremity, from which it becomes abruptly smaller, and then continues of a regular size to the end. These three kinds have at least six, and at most twelve or thirteen arms, though sometimes the griseus is met with having eighteen arms. They can contract themselves till their bodies do not exceed one-tenth of an inch in length, and they can stop at any intermediate degree of contraction or extension. They are of various sizes, from half an inch to an inch and a half long; their arms are seldom longer than their bodies, though some have them an inch, and some even eight inches

long. The thickness of their bodies decreases as they extend themselves, and vice versâ; and they may be made to contract themselves either by agitating the water in which they are contained, or by touching the animals themselves. When taken out of the water, they all contract so much that they appear only like a little lump of jelly. The arms have the same power of contraction or expansion that the body has; and they can contract or expand one arm, or any number of arms, independent of the rest; and they can likewise bend their bodies or arms in all possible directions. They can also dilate or contract their bodies in various places, and sometimes appear thick set with folds, which, when carelessly viewed, appear like wings. Their progressive motion is performed by that power which they have of contracting and dilating their bodies. When about to move they bend down their head and arms, lay hold by means of them on some other substance to which they design to fasten themselves; then they loosen their tail, and draw it towards the head; then either fix it in that place, or, stretching forward their head as before, repeat the same operation. They ascend or descend at pleasure in this manner upon aquatic plants, or upon the sides of the vessel in which they are kept; they sometimes hang by the tail from the surface of the water, sometimes by one of the arms; and they walk with ease upon the surface of the water. On examining the tail with a microscope, a small part of it will be found to be dry above the surface of the water, and in a little concave space, of which the tail forms the bottom; so that it seems to be suspended on the surface of the water, on the same principle that a small pin or needle is made to swim.

When a polype, therefore, means to pass from the sides of the glass to the surface of the water, it has only to put that part out of the water by which it is to be supported, and to give it time to dry, which it always does upon these occasions; and they attach themselves so firmly by the tail to aquatic plants, stones, &c., that they cannot be easily disengaged: they often further strengthen these attachments by means of one or two of their arms, which serve as a kind of anchors for fixing them to the adjacent substances. The stomach of the polype is a kind of bag or gut into which the mouth opens, and goes from the head to the tail. This, in a strong light, is visible to the naked eye, especially if the animal be placed between the eye and a candle; for these animals are quite transparent, whatever their color may be. The stomach, however, appears to more advantage through a powerful magnifier. Mr. Trembley, by cutting one of these animals transversely into three parts, satisfied himself that they were perforated throughout. Each piece immediately contracted itself, and the perforation was very visible through a microscope. The skin which encloses the stomach is that of the polype itself; so that the whole animal, properly speaking, consists only of one skin, in the form of a tube, and open at both ends. No vessels of any kind are to be distinguished. The mouth is situated at the anterior end in the middle between the shooting forth of the arms, and assumes different appearances according to circumstances; being sometimes lengthened out in the form of a nipple, at others appearing truncated; sometimes the aperture is quite closed, at others there is a hollow; though at all times a small aperture may be discovered by a powerful magnifier. The skin of a polype, when examined with a microscope, appears like shagreen, covered with little grains, more or less separated from each other, according to the degree of contraction of the body. If the lips of the polype be cut transversely, and placed so that the cut part of the skin may lie directly before the microscope, the skin throughout its whole thickness will be found to consist of an infinite number of grains, and the interior part to be more shagreened than the exterior one; but they are not strongly united to each other, and may be easily separated. They even separate of themselves, though in no great numbers, in the most healthy animals of this kind; for, where they are observed to separate in large quantities, it is a symptom of a very dangerous disorder. In the progress of this disorder the surface of the polype becomes gradually more and more rough and unequal, and no longer well defined or terminated as before. The grains fall off on all sides; the body and arms contract and dilate, and assume a white shining color; and at last the whole dissolves into a heap of grains, which is more particularly observed in the green polype.

The skin of the polype is entirely composed of grains, cemented by a kind of gummy substance; but it is to the grains entirely that the polype owes its color. The structure of the arms is analogous to that of the body; and they appear shagreened when examined by the microscope, whether they be in a state of contraction or extension; but if very much contracted they appear more shagreened than the body, though quite smooth when in their utmost state of extension. In the green polype the appearance of the arm is continually varying; and these variations are more sensible towards the extremity of the arm than at its origin, but more scattered in the parts further on. The extremity is often terminated by a knob, the hairs of which cannot be observed without a very powerful magnifier. They have a remarkable inclination of turning towards the light; so that if that part of the glass on which they are be turned from the light, they will quickly remove to the other. The fuscus has the longest arms, and makes use of the most curious manœuvres to seize its prey. They are best viewed in a glass seven or eight inches deep, when their arms commonly hang down to the bottom. When this, or any other kind is hungry, it spreads its arms in a kind of circle to a considerable extent, enclosing in this, as in a net, every insect which comes within the circumference. While the animal is contracted by seizing its prey, the arms are observed to swell like the human muscles when in action. Though no appearance of eyes can be observed in the polype, they certainly have some knowledge of the approach of their prey, and show the greatest attention to it as soon as it comes near them. It seizes a worm the moment it is touched by one

of the arms; and in conveying it to the mouth it frequently twists the arm into a spiral like a cork-screw; by which means the insect is brought to the mouth in a much shorter time than otherwise it would be; and so soon are the insects on which the polypes feed killed by them, that M. Fontana thinks they must contain the most powerful kind of poison; for the lips scarcely touch the animal when it expires, though there cannot be any wound perceived on it when dead. The worm, when swallowed, appears sometimes single, sometimes double, according to circumstances. When full, the polype contracts itself, hangs down as in a kind of stupor, but extends again in proportion as the food is digested and the excrementitious part is discharged. The bodies of the insects, when swallowed, are first macerated in the stomach, then reduced into fragments, and driven backward and forward from one end of the stomach to the other, and even into the arms, however fine they be; whence it appears that the arms, as well as the other parts of this remarkable creature, are a kind of hollow gut. To observe this motion it is best to feed the polypes with such food as will give a lively color; such, for instance, as those worms which are furnished with a red juice. Some bits of a small black snail being given to a polype, the substance of the skin was soon dissolved into a pulp consisting of small black fragments; and, on examining the polype with a microscope, it was found that the particles were driven about in the stomach, and that they passed into the arms, from thence back again into the stomach, then to the tail; whence they passed again into the arms, and so on. The grains of which the body of the polype consist take their color from the food with which it is nourished, and become red or black as the food happens to afford the one color or the other. They are likewise more or less tinged with these colors in proportion to the strength of the nutritive juices; and they lose their color if fed with aliments of a color different from themselves. They feed on most insects found in fresh water; and on worms, the larvæ of gnats, &c., and even on snails, large aquatic insects, and fish or flesh if in small bits. Sometimes two polypes lay hold of the same worm, and each begins to swallow at its own end till their mouths meet and the worm breaks. Nay, the one polype will sometimes devour the other along with its portion. It appears, however, that the stomach of one polype is not fitted for dissolving the substance of another; for the one which is swallowed always gets clear again after being imprisoned for an hour or two.

The manner in which the polype generates is most perceptible in the griseus and fuscus, as being considerably larger than the viridis. If we examine one of them in summer, when the animals are most active, and prepared for propagation, some small tubercles will be found proceeding from its sides, which constantly increase in bulk, until, in two or three days, they assume the figure of small polypes. When they first begin to shoot, the excrescence becomes pointed, assuming a conical figure, and deeper color than the rest of the body. In a short time it becomes truncated, and then cylindrical, after which the arms begin to shoot from the anterior end. The tail adheres to the body of the parent animal, but gradually grows smaller, until at last it adheres only by a point, and is then ready to be separated; when both the mother and young ones fix themselves to the sides of the glass, and are separated from each other by a sudden jerk. The time requisite for the formation of the young ones is very different, according to the warmth of the weather and the nature of the food eaten by the mother. Sometimes they are fully formed and ready to drop off in twenty-four hours; but when the weather is cold fifteen days are requisite for bringing them to perfection. There is a reciprocal communication of food betwixt the young and old before they be separated. The young ones, as soon as they are furnished with arms, catch prey for themselves, and communicate the digested food to the old ones, who on the other hand do the same to the young ones. The polypes produce young ones indiscriminately from all parts of their bodies, and five or six young ones have frequently been produced at once; nay, Mr. Trembley has observed nine or ten produced at the same time. Nothing like copulation among these creatures was ever observed by Mr. Trembley, though for two years he had thousands of them under his inspection. To be more certain on this subject he took two young ones the moment they came from their parent, and placed them in separate glasses. Both of them multiplied, not only themselves, but also their offspring, which were separated and watched in the same manner to the seventh generation; they have even the same power of generation while adhering to their parent. In this state the parent, with its children and grandchildren, exhibits a singular appearance, looking like a shrub thick set with branches. Thus several generations are attached to one another, and all of them to one parent. Mr. Adams gives a figure of one polype with nineteen young ones hanging at it; the whole group being about an inch broad, and an inch and a half long: the old polype ate about twelve monoculi per day, and the young ones about twenty among them.

When a polype is cut transversely or longitudinally into two or three parts, each part in a short time becomes a perfect animal; and so great is this prolific power that a new animal will be produced even from a small portion of the skin of the old one. If the young ones be mutilated while they grow upon the parent, the parts so cut off will be reproduced, and the same property belongs to the parent. A truncated portion will send forth young ones before it has acquired a new head and tail of its own, and sometimes the head of the young one supplies the place of that which should have grown out of the old one. If we slit a polype longitudinally through the head to the middle of the body, we shall have one formed with two heads; and by slitting these again in the same manner we may form one with as many heads as we please. A still more surprising property of these animals is, that they may be grafted together. If the truncated portions of a polype be placed end to end, and gently pushed together, they will unite

into a single one. The two portions are first joined together by a slender neck, which gradually fills up and disappears, the food passing from the one part into the other; and thus we may form polypes not only from portions of the same, but of different animals; we may fix the head of one to the body of another, and the compound animal will grow, eat, and multiply, as if it had never been divided. By pushing the body of one into the mouth of another, so far that their heads may be brought into contact, and kept there for some time, they will at last unite into one animal, only having double the number of arms which it would otherwise have had. The fuscus may be turned inside out like a glove, at the same time that it continues to live and act as before. The lining of the stomach now forms the outer skin, and the former epidermis constitutes the lining of the stomach. If previous to this operation the polype have young ones attached to it, such as are but newly beginning to vegetate turn themselves inside out, while the larger ones continue to increase in size till they reach beyond the mouth of the parent, and are then separated in the usual manner from the body. When thus turned the polype combines itself in many different ways. The fore part frequently closes and becomes a supernumerary tail. The animal, which was at first straight, now bends itself, so that the two tails resemble the legs of a pair of compasses, which it can open and shut. The old mouth is placed as it were at the joint of the compasses, but loses its power of action; to supply which a new one is formed in its neighbourhood; and in a little time there is a new species of polypus formed with several mouths. The sides of a polype, which has been cut through in a longitudinal direction, begin to roll themselves up, commonly from one of the extremities, with the outside of the skin inwards; but in a little time they unroll themselves, and the two cut edges join together, sometimes beginning at one extremity, and sometimes approaching throughout their whole length. As soon as the edges join they unite so closely that no scar can be perceived. If a polype be partly turned back, the open part closes, and new mouths are formed in different places. Every portion of a polype is capable of devouring insects almost as soon as it is cut off; and the voracity of the whole genus is astonishing; for Mr. Adams observes that most of the insects on which they feed bear the same proportion to the mouth of a polype that an apple of the size of a man's head bears to his mouth.

4. P. hydratulus has a vesicular body, and four obsolete arms. It is found in the abdomen of sheep, swine, &c. The hydratulus is mentioned by many medical writers. Dr. Tylon, in dissecting an antelope, found several hydratides of films, about the size of a pigeon's egg, filled with water, and of an oval form, fastened to the omentum; and some in the pelvis, between the bladder of urine and rectum. He suspected them to be animals, for the following reasons: 1. Because they were included in a membrane like a matrix, so loosely that by opening it with the finger, or a knife, the internal bladder, containing the serum or lymph, seemed nowhere to have any connexion with it, but would very readily drop out, still retaining its liquor, without spilling any. 2. This internal bladder had a neck or white body, more opaque than the rest, and protuberant from it, with an orifice at its extremity; by which, as with a mouth, it exhausted the serum from the external membrane, and so supplied its bladder or stomach. 3. On bringing this neck near the candle, it moved and shortened itself. It is found in the abdomen of sheep, swine, mice, &c., lying between the peritoneum and the intestines.

5. P. pallens has generally about six arms of a moderate length. The polypus hydra pallens is very rarely met with, and is described only by M. Roesel. It is of a pale yellow color, growing gradually smaller from the bottom; the tail is round or nobbed; the arms are about the length of the body, of a white color, generally seven in number, and are apparently composed of a chain of globules. The young are brought forth from all parts of its body.

6. P. socialis is bearded, thick, and wrinkled. The hydra socialis is described by Muller under the title of vorticella. They are found in clusters; and, when viewed by a microscope, appear like a circle surrounded with crowns or ciliated heads, tied by small thin tails to a common centre, from whence they advance towards the circumference, and then turn like a wheel, occasioning a vortex which brings along with it the food proper for them. See ANIMALCULE.

7. P. stentoreus, the funnel-shaped polype, has a mouth surrounded with a row of hairs. This species is of three colors, green, blue, and white; but the last is the most common. They do not form clusters, but adhere singly by the tail to whatever comes in their way: the anterior end is wider than the posterior; and, being round, gives the animal somewhat of a funnel form, though the circle is interrupted by a kind of slit or gap. The edge of this gap is surrounded with a great number of little fimbrillæ, which by their motions excite a current of water, that forces into the mouth of the animal the small bodies that come within its reach. Mr. Trembley says that he has often seen a great number of animalcules fall into the mouths of these creatures, some of which were let out again at an opening which he could not describe. They can fashion their mouths into several different forms; and they multiply by dividing neither transversely nor longitudinally, but diagonally.

8. P. viridis, the green polype, has commonly ten short arms.

POLYPUS MARINUS is different in form from the fresh-water polype already described, but is nourished, increases, and may be propagated, after the same manner; Mr. Ellis having often found in his enquiries that small pieces cut off from the living parent, in order to view the several parts more accurately, soon gave indications that they contained not only the principles of life, but likewise the faculty of increasing and multiplying into a numerous issue. It has been discovered and sufficiently proved by Peyssonel, Ellis, Jussieu, Reaumur, Donati, &c., that many of those substances which had formerly been

considered by naturalists as marine vegetables or sea-plants are in reality animal productions; and that they are formed by polypes of different shapes and sizes, for their habitation, defence, and propagation. To this class may be referred the corals, corallines, keratophyta, eschara, sponges, and alcyonium: nor is it improbable that the more compact bodies, known by the common appellation of star-stones, brain stones, petrified fungi, and the like, brought from various parts of the East and West Indies, are of the same origin. Mr. Ellis observes that the ocean, in all the warmer latitudes, near the shore, and wherever it is possible to observe, abounds so much with animal life, that no inanimate body can long remain unoccupied by some species. In those regions, ship's bottoms are soon covered with the habitation of thousands of animals; rocks, stones, and every thing lifeless, are covered with them instantly; and even the branches of living vegetables that hang into the water are immediately loaded with the spawn of different animals, shell fish of various kinds; and shell-fish themselves, when they become impotent and old, are the basis of new colonies of animals. For a further account of this system, see CORALLINA and CORALLINES.

POLYPUS OF THE HEART, a fleshy rooted excrescence, growing from a part of its substance. See SURGERY.

POLYPUS, in surgery, in Cullen's nosology, a species of sarcoma or tumor, which is generally narrow where it originates, and then becomes wider, somewhat like a pear. It is most commonly met with in the nose, uterus or vagina; and has received its name from an erroneous idea, that it usually had several roots, or feet, like zoophite polypi. See SURGERY.

POLYSPHERCON, one of the officers of Alexander the Great. Antipater, at his death, appointed him governor of Macedonia, in preference to his own son Cassander; yet, notwithstanding his age and experience, he showed great ignorance in government. He became cruel, not only to the republican Greeks, and such as opposed his ambitious views, but even to the helpless children and friends of Alexander, to whom he owed his rise and reputation. He was killed in battle, A. A. C. 309. Curt. Diod. 17, Justin 13. See MACEDON.

POLYSYLLABLE, *n. s.* Fr. *polysyllable*, Gr. πολυς and συλλαβη. A word of many syllables.

In a *polysyllable* word consider to which syllable the emphasis is to be given, and in each syllable to which letter. *Holder.*

Your high nonsense blusters and makes a noise; it stalks upon hard words, and rattles through *polysyllables.* *Addison.*

• *Polysyllabical* echoes are such as repeat many syllables or words distinctly. *Dict.*

POLYSYLLABLE, in grammar, is a word consisting of more than three syllables; for when a word consists of one, two, or three syllables, it is called a monosyllable, a dissyllable, or a trisyllable.

POLYTECHNIQUE, Fr. ecole polytechnique, a word derived from the Greek, and used by the French to distinguish an establishment in which all sciences are taught. The military school, which existed during the French monarchy, was comprised by Buonaparte in this institution.

POLYTHEISM.

POLYTHE'ISM, *n. s.* } Fr. *polytheisme;*
POLYTHE'IST. } Gr. πολυς and θεος.
The doctrine of plurality of gods: one who holds that doctrine.

The first author of *polytheism*, Orpheus, did plainly assert one supreme God. *Stillingfleet.*

Some authors have falsely made the Turks *polytheists.* *Duncomb.*

POLYTHEISM. 'That there exist beings, one or many, powerful above the human race, is a proposition,' says lord Kames, 'universally admitted as true in all ages and among all nations.' This universal belief his lordship founds upon instinct or internal sense. The apostle Paul seems to teach a similar, only a far clearer and nobler doctrine when he asserts 'the Eternal power and Godhead' of one glorious Creator to be clearly seen in the creation of the world and its appendages. But it is one thing to contend for what unsophisticated and unpolluted reason would see in the works of nature, and another to state what mankind have deduced from them, or rather in contempt of their lessons: for reason and revelation have in fact been generally disused and abused together.

In point of fact, we believe all the false religions of the world to be traceable to revelation more or less corruptly transmitted. Assuming, then, that the first men professed pure theism, we may endeavour to trace the rise and progress of polytheism and idolatry; and to ascertain the real opinions of the Pagan world concerning that multitude of gods with which they filled heaven, earth, and hell.

Whether we believe, with the author of the book of Genesis, that all men have descended from the same progenitors; or adopt the hypothesis of modern theorists, that there have been successive creations of men; polytheism and idolatry will be seen to have arisen from the same causes, and to have advanced nearly in the same order from one degree of impiety to another. On either supposition, the original progenitors must have been instructed by their Creator in the truths of genuine theism; and there is no room to doubt but that those truths, simple and sublime as they are, would be for a while conveyed pure from father to son, particularly whilst the race lived as one family, and were not spread over a large extent of country. If any credit be due to the records of antiquity, the primeval inhabitants of this globe lived to so great an age that they must have increased to a very large number long before the death of the common parent, who would of course be the bond of union to the whole society, and whose dictates,

in what related to the origin of his being and the existence of his Creator, would be listened to with the utmost respect by every individual of his numerous progeny.

Many causes, however, would conspire to dissolve this family into separate and independent tribes, of which some would be driven by violence, others would voluntarily wander, to a distance from the rest. The first wanderers would retain in tolerable purity their original notions of Deity; and they would certainly endeavour to impress those notions upon their children: but, in circumstances much more favorable to speculation than theirs could have been, the human mind dwells not long upon notions purely intellectual; and their personal and social corruptions would soon render the recognition of a pure and holy Being, as the object of their homage, unwelcome to their thoughts. Bishop Law has supposed very early generations of men (even those to whom he contends that frequent revelations were vouchsafed) were anthropomorphites in their conceptions of the Divine Being.

Of pure mind, separated from matter, men in these circumstances would not long retain the faintest notion; but conscious each of power in himself, and experiencing the effects of power in the great agencies of nature, as, for instance, the sun, they would conceive that luminary to be animated as their bodies were animated. They would feel his influence when above the horizon; they would see him moving from east to west; they would consider him when set as gone to take his repose: and, those exertions and intermissions of power being analogous to what they experienced in themselves, they would look upon the sun as a real animal. Thus to their gross minds would the Divinity soon appear altogether such a one as themselves, a compound being partly corporeal and partly spiritual; and, as soon as they imbibed such notions, they may be pronounced to have become idolaters.

When the human mind had once received this direction its gods would multiply with wonderful rapidity. Darkness and cold men could not but perceive to be contrary to light and heat; and, not having philosophy to distinguish between mere privations and positive effects, they would consider darkness and cold as entities equally real with light and heat, and attribute these different and contrary effects to different and contrary powers. Hence the spirit or power of darkness was in all probability the second god in the Pagan calendar; and as they considered the power of light as a benevolent principle, the source of all that is good, they looked upon the contrary power of darkness as a malevolent spirit, the source of all that is evil. This we know, at least, from history to have been the belief of the Persian magi, a very ancient sect, who called their good god Yazdan, and Ormuzd, or Oromazdes, and the evil god Ahriman. See ARIMANIUS. Considering light as the symbol, or perhaps as the body, of Ormuzd, they always worshipped him before the fire, and especially before the sun, the source of the most perfect light; and for the same reason fires were kept continually burning on his altars. That they sometimes addressed prayers to the evil principle, we are informed by Plutarch, in his life of Themistocles; but with what rites he was worshipped, or where he was supposed to reside, is not so evident. Certain it is, that his worshippers held him in detestation; and, when they had occasion to write his name, they always inverted it (uɐɯıɹɥ∀), to denote the malignity of his nature.

The principles of the magi, though widely distant from pure theism, were much less absurd than those of other idolaters. They never worshipped their gods by images, or had any other emblems of them than light and darkness. Diogenes Laertius and Clemens Alexandrinus say, that they condemned all statues and images, allowing fire and water to be the only proper emblems or representatives of their gods. And Cicero reports that at their instigation Xerxes burnt all the temples of Greece, because the builders of those edifices impiously presumed to enclose within walls the gods, to whom all things ought to be open and free, and whose proper temple is the whole world. Indeed all historians agree that, when magianism was the religion of the court, the Persian monarchs demolished all images.

The worship of the sun soon introduced that of the other heavenly bodies. Men could not but experience great benefit from those luminaries in the absence of their chief god; and, when they had admitted two divine principles, it was natural to consider the moon and the stars as benevolent intelligences, sent to oppose the power of darkness whilst their greatest divinity was absent or asleep. It was thus that he maintained a constant superiority over the evil principle. The moon, to the vulgar eye, appears much more magnificent than a planet or star. By these idolaters she was considered as the divinity second in rank and in power; and whilst the sun was worshipped as the king, she was adored as the queen of heaven.

The earth, as the common mother of all things; the ocean, whose waters never rest; the air, the region of tempests; and all the elements, were gradually added to the number of divinities. The polytheists, of whom we now treat, conceived every thing in motion to be animated by an intelligence powerful in proportion to the magnitude of the body moved. This sect of idolaters, which remains in some parts of the east to this day, was named SABIANS, see that article. This species of idolatry is thought to have first prevailed in Chaldea, and to have been that from which Abraham separated himself, when, at the command of the true God, he 'departed from his country, and from his kindred, and from his father's house.'

That savages have universally worshipped, as their first and supreme divinities, the sun, moon, and stars, is a fact evinced by every historian; looking, however, at the progressive history of idolatry in the ancient monarchies of the world, we shall find it aided, probably, by the remaining gleams of tradition, as to the actual manifestations of God. From the pentateuch, we learn, that when, in the first ages, the Supreme Being condescended to manifest his presence to men,

he often exhibited some sensible emblem of his power and glory, as in the declaration of his will from the midst of a preternatural fire. Thus he appeared to Moses himself, when he spoke to him from the burning bush; it was by a pillar of cloud and fire that he led the Israelites from Egypt to Canaan; and it was in the midst of smoke, and fire, and thunderings, that the law was delivered from Mount Sinai. That such manifestations of the Divine Presence would be occasionally made to the descendants of Noah, who settled in Chaldea after the deluge, must appear extremely probable; and from the Hebrew Scriptures we know the Chaldeans to have been a civilised people when they fell into idolatry. All history likewise represents the Chaldeans as at a very early period corrupted by luxury and vice. When this happened the moral governor of the universe would withdraw from them those occasional manifestations, and leave them to their own inventions. In such circumstances, a people addicted to astronomy, who had been taught that the Deity often appeared to their ancestors in a flame of fire, would be quite prepared to consider the sun as the place of his permanent residence, if not as his body. And, when either opinion was firmly established, polytheism would be its inevitable consequence.

From Chaldea the idolatrous worship of the host of heaven spread itself over the East, passed into Egypt, and thence into Greece, as Plato affirms. That Sabiism was the first species of idolatry, beside the many allusions to it in Scripture, we have the evidence of the most ancient pagan historians, of whose writings any part has reached us. Herodotus, speaking of the religion of the Persians, says that they worship the sun, moon, and earth, fire, water, and the winds; and this adoration they have all along paid. He testifies the same thing of the savage Africans. Diodorus Siculus tells us that the first men supposed the sun and moon to be the principal and eternal gods. And Sanchoniathon, in the fragment preserved by Eusebius, that the two first mortals were Æon and Protogonus; and their children Genus and Genea, who inhabited Phœnicia; and, that when they were scorched with the heat, they lifted up their hands to the sun, whom they believed to be the Lord of Heaven, and called him Baalsamen, the same whom the Greeks call Ζευς.

Hitherto those divinities were worshipped in person, or, as Prideaux expresses it, in their sacella or sacred tabernacles. But, their grossly ignorant worshippers not supposing it possible that any intelligence could exert its influence but in union with some body, statues or pillars were thought of as proper emblems of the absent gods. Sanchoniathon says that Hyspouranios and his brother Ousous, Phœnician patriarchs, erected two pillars, the one to fire, and the other to air or wind, and worshipped those pillars, pouring out to them libations of the blood of the wild beasts hunted down in the chase. As these early monuments of idolatry were called βαιτυλια, a word probably derived from the Hebrew Bethel, it is also probable they were altars of loose stones, such as that which Jacob erected. As his was erected in honor of the true God, theirs was consecrated to the host of heaven; and the form of consecration seems to have been the same anointing the stone or pillar with oil. When this was done, the ignorant worshippers supposed the intelligences by which the sun and planets were animated took possession of the consecrated pillars; and, as they were dedicated to the host of heaven, they were generally erected on the tops of mountains. The practice prevailed universally through the east; and there was nothing which Moses more strictly enjoined his people to destroy than the altars, statues, and pillars, erected upon high places. See Deut. xii. 23.

Another species of idolatry was perhaps the second in order. The Chaldeans, Egyptians, and all the Eastern nations who believed in a superintending providence, imagined that the government of this world, the care of particular nations, and even the superintendance of groves, rivers, and mountains, in each nation, was committed by the gods to a class of spirits superior to the soul of man, but inferior to those heavenly intelligences which animated the sun, the moon, and the planets. These spirits were by the Greeks called δαιμονες, demons, and by the Romans genii. The belief of their existence would seem to have been derived from various different sources.

1. It appears to have been impossible for those men who could not form a notion of a God divested of body and a place, to conceive how the influence and agency of such a being could every instant extend to every point of the universe. Hence they placed the heavenly regions under the government of a multitude of heavenly gods, the sun, the moon, and the stars. But, as the nearest of those was at an immense distance from the earth, they thought that these superior governors of universal nature employed subordinate demons, to execute their behests.

2. A state of indolence was held an indispensable ingredient in perfect felicity. This notion made Epicurus deny the providence, whilst he admitted the existence, of gods; if it had such an effect upon a philosopher, who in the most enlightened ages had many followers, it would naturally lead untaught idolaters to imagine that the governors of the universe had devolved a great part of their trouble on deputies.

3. When men reflected on the infinite distance between themselves and the gods, they would naturally wish that there might somewhere exist a class of intermediate intelligences, whom they might employ as intercessors with the gods. What men wish, they readily believe. Hence another fruitful source of intermediate intelligences, more pure than human souls.

4. The next opinion was the offspring of philosophy. On this earth we perceive a scale of beings rising gradually above each other in perfection, from mere brute matter through fossils, vegetables, insects, fishes, birds, and beasts, up to man. But the distance between man and God is infinite, and capable of admitting numberless orders of intelligences, all superior to the human soul, and each rising gradually above the

other, till they reach that point at which creation stops. Part of this immense chasm philosophers perceived to be actually filled by the heavenly bodies (for in philosophical polytheism there was an occasional recognition of one invisible God supreme over all); but still there was an immense vacuity between the human species and the moon, the lowest of the heavenly host; and this they imagined must be occupied by invisible inhabitants of different orders which they called good and evil demons.

5. Tradition is another source from which the universal belief of good and evil demons may be derived. If the Mosaic account of the creation of the world, the peopling of the earth, and the dispersion of mankind, be true (and a more consistent account has not as yet been given), some knowledge of good and evil angels must have been transmitted from father to son by oral tradition. This tradition would be corrupted. When the true God was considered, not as sole governor of the universe, but only as the self-existent power of light and good, the devil would be elevated from the rank of a rebellious created spirit to that of the independent power of darkness and evil; the angels of light would be transformed into good demons, and those of darkness into evil demons. This account of the origin of demonology receives no small support from Plato, who derives one branch of it wholly from tradition.

Though these demons were generally invisible, they were not supposed to be pure disembodied spirits.—Proclus in his Commentary upon Plato's Timæus, tells us, that 'every demon superior to human souls consisted of an intellectual mind and an ethereal vehicle.' Plato himself divides the class of demons into three orders; and, whilst he holds their souls to be particles or emanations from the divine essence, he affirms that the bodies of each order are composed of that particular element in which they for the most part reside; and, though all nature was full of them, they were believed to have local attachments to mountains, rivers, and groves, where their appearances were most frequent; and that, like men, they delighted in the shady grove, and in the purling stream. Hence the earliest altars of paganism were built in groves, or on the banks of rivers; because it was believed that in such places were assembled multitudes of those intelligences, to carry their prayers and oblations to the far distant residence of the celestial gods. Hence too are to be derived the mountain and river gods, with the dryads and hamadryads, the satyrs, nymphs, and fauns, which make so conspicuous a figure in the Greek and Roman mythology.

These different orders of intelligences, who, though worshipped as demigods, were yet believed to partake of human passions, led the way to the deification of departed heroes and other eminent benefactors of mankind. By the philosophers, all souls were believed to be emanations from the divinity; but 'gratitude and admiration concurred to make man regard the inventors of arts and the founders of society as having more than a common ray of the divinity. So that the deceased founder of a people was easily advanced into the rank of a demon. When the religious bias was in this train, natural affection would have its share in promoting this new species of worship; and, as the natural father was often also the political father of a people, such persons would soon be deified. Fondness for the offspring would next have its turn; and a disconsolate father, at the head of a people, would contrive to sooth his grief for the untimely death of a favorite child, and to gratify his pride, by paying divine honors to its memory.' That this was the origin and progress of the worship of departed souls, we have the authority of Sanchoniathon, where the various motives for this species of idolatry are recounted in express words. 'After many generations,' says he, 'came Chrysor; and he invented many things useful to civil life, for which, after his decease, he was worshipped as a god. Then flourished Ouranos (heaven) and his sister Ge (Earth), who deified and offered sacrifices to their father Hypsistos, when he had been torn in pieces by wild beasts. Afterwards Cronos (Time) consecrated Muth his son, and was himself consecrated by his subjects.'

In the reign of Cronos is said to have flourished a personage of great reputation for wisdom, who by the Egyptians was called Thoth, by the Phœnicians Taautos, and by the Greeks Hermes. According to Plutarch, he was a profound politician, and chief counsellor to Osiris, then king of Egypt: and Philo Byblius, the translator of Sanchoniathon, adds, 'that it was this Thoth or Hermes who first brought religious worship into due method and order.' To make religion serviceable to the state, he appointed Osiris and other departed princes to be joined with the stars and worshipped as gods; and being by Cronos made king of Egypt, he was, after his death, worshipped himself as a god by the Egyptians. To this honor he had indeed a better title than most princes, if what is said be true, that he was the inventor of letters, arithmetic, geometry, astronomy, and hieroglyphics, and was therefore one of the greatest benefactors of the human race. That the gods of Greece and Rome were derived from Egypt and Phœnicia is universally known. See our article MYSTERIES and MYTHOLOGY.

The deification of departed heroes and statesmen introduced the universal belief of national and tutelar gods, as well as the practice of worshipping those gods through the medium of statues. When the founder of a state was elevated to the rank of a god, as he was believed still to retain human passions and affections, it was natural to suppose he would favor that nation for which he had done so much upon earth; that he would oppose its enemies, and protect the laws and institutions which he had given it. By the same train of sentiment, each city, and even every family found *Lares* and *Penates* among their departed ancestors, under whose protection they believed their private affairs to be placed. Those national and houshold gods were believed to be, in their deified state, clothed with aërial bodies, in the same form which their grosser bodies had upon earth.

Hitherto the souls of departed heroes held the rank only of demons or demigods; but they gradually rose, till they dethroned the heavenly bodies and became themselves the dii majorum

gentium. This revolution was the combined operation of the prince and the priest; and the first step taken towards it seems to have been the complimenting their heroes and public benefactors with the name of that being which was most esteemed and worshipped. Thus a king for his beneficence was called the sun, and a queen for her beauty the moon; and Diodorus relates that Sol first reigned in Egypt, called so from the luminary in the heavens. As this adulation advanced into established worship, they turned the compliment the other way, and called the planet or luminary after the hero, the better to accustom the people, even in the act of planet-worship, to this new adoration. Diodorus says that the sun was called Osiris, and the moon Isis. Macrobius, that the Ammonites called the sun Moloch; the Syrians Adad; the Arabs Dionysus; the Assyrians Belus; the Phœnicians Saturn; the Carthaginians Hercules; and the Palmyrians Elegabalus. By the Phrygians the moon was called Cybele; by the Athenians Minerva; by the Cyprians Venus; by the Cretans Diana; by the Sicilians Proserpine; by others Hecate, Bellona, Vesta, Urania, Lucina, &c.

As a farther proof that hero worship was thus superinduced upon the planetary, the first statues consecrated to the greater hero-gods, those who were supposed to be supreme, were not of a human form, but conical or pyramidal, like those which in the earliest ages of idolatry were dedicated to the sun and planets. Pausanias says that the statue of Jupiter Mellichius represented a pyramid; that of the Argive Juno did the same, as appears from a verse of Phoronis quoted by Clemens Alexandrinus; and indeed the practice was universal, both among barbarians and Greeks.

This short sketch of the progress of polytheism and idolatry will account for many circumstances recorded of the pagan gods, which at first view seem surprising, and which at last brought the whole system into contempt among the philosophers of Athens and Rome; viz. the immoral characters of those divinities, and the abominable rites with which they were worshipped. Jupiter, Apollo, Mars, and the whole pantheon, are described by the poets as violaters of women and notorious adulterers. Mercury was a thief, and the god of thieves. Venus was a prostitute, and Bacchus a drunkard. The malice and revenge of Juno were implacable; and so little regard was any of them supposed to pay to the laws of honor and rectitude, that it was a common practice of the Romans, when besieging a town, to invoke the tutelar deity, and to tempt him by a bribe to betray his friends and votaries. In a word, they were, in the language of the poet,

> 'Gods partial, changeful, passionate, unjust,
> Whose attributes were, rage, revenge, and lust.'

Having once animated human bodies, and being supposed still to retain human passions and appetites, they were believed, in their deified state, to feel the same sensual desires which they had felt upon earth, and to pursue the same means for their gratification. As men could not well attempt to surpass the gods in purity and virtue, they were easily persuaded by profligate priests, that the most acceptable worship to be paid to any deity was to imitate the example of that deity, and to indulge in the practices over which he presided. Hence the worship of Bacchus was performed during the night by men and women mixing in the dark after intemperate eating and drinking. Hence too it was the practice in Cyprus and some other countries to sacrifice to Venus the virginity of young women some days before their marriage, in order, as it was pretended, to secure their chastity ever afterwards; and, Herodotus says, every woman among the Babylonians was obliged once in her life to prostitute herself in the temple of the goddess Mylitte (Venus), that she might thenceforward be proof against temptation.

Thus the origin of polytheism and its whole progress and consequences alike connect it with vices and impurities of every kind. It had its origin at no period and amongst no people of the world, in absolute ignorance of the true God, nor in any impossibility of perpetuating the knowledge of Him: but, in the emphatic language of the philosophic apostle, because they *did not like* to retain God in their knowledge.

The progress of polytheism, as far as we have traced it, has been regular; and, after the enormous error of forsaking the worship of the true God was admitted, every subsequent step appears natural. It would be easy to prove that it has likewise been universal. Sir William Jones has discovered such a striking resemblance between the gods of ancient Greece and those of the pagans of Hindostan as puts it beyond a doubt that those divinities had the same origin. The Ganesa of the Hindoos he has clearly proved to be the Janus of the Greeks and Romans. The Saturn of Greece and Rome, the same with the Menu or Satyavkara of Hindostan, whose patronymic is Vaivaswata, child of the sun. The Roman Jupiter had the same attributes with the Indian god of the visible heavens called Indra, or the king, and Divespeter, or lord of the sky, whose consort is Sachi, and whose weapon is vajra or the thunderbolt. Indra is the regent of winds and showers; and, though the east is peculiarly under his care, yet his Olympus is the north pole. With all his power he is a subordinate deity, far inferior to the Indian triad Brahma, Vishnou, and Mahadeva or Siva, who are three forms of one and the same godhead. Having traced the resemblance between the idolatry of Rome and India through many other gods, this distinguished orientalist observes, 'on a close examination, the characters of all the pagan deities melt into each other, and at last into one or two: the whole crowd of gods and goddesses in ancient Rome and Hindostan mean only the powers of nature.' From every account which modern travellers give of the religion of savage nations, it not only appears that those nations adore, as their first and greatest gods, the sun, moon, and stars; but that such of them as have any other divinities have proceeded from the worship of the heavenly bodies to that of celestial demons, and from these to the deification of dead men. They also universally believe their hero-gods and demi-gods to retain the passions, appetites, and propensities of men.

That our Scandinavian and Saxon ancestors had the same notions of the gods with the other pagans is evident from their calling the days of the week by the names of their divinities, and from the forms of the statues by which those divinities were represented. 1. Thus the idol of the sun, from which our Sunday is derived, was placed in a temple and sacrificed to; for they believed that the sun co-operated with this idol. He was represented as a man half naked, with his face like the sun, holding a burning wheel with both hands on his breast, signifying his course round the world; and, by its fiery gleams, the light and heat with which the sun warms and nourisheth all things. 2. The idol of the moon, from which our Monday is named, anciently Moonday, appears habited in a short coat like a man, holding a moon. 3. Tuisco, the most ancient and peculiar god of the Germans, represented in his garment of a skin according to their ancient manner of clothing, was, next to the sun and moon, the idol of highest rank in northern paganism. To him the third day of the week was dedicated Tuesday or Tuisday. 4. Woden was a valiant prince among the Saxons. His image was prayed to for victory; which, if they obtained, they usually sacrificed the prisoners taken in battle to him. Wednesday is derived from him, anciently Wodensday. The northern histories make him the father of Thor, and Friga to be his wife. 5. Thor was placed in a large hall, sitting on a bed canopied over, with a crown of gold on his head, and twelve stars over it, holding a sceptre in the right hand. To him was attributed the power over both heaven and earth; so that as he was pleased or displeased he could send thunder, tempests, plagues, &c., or fair and seasonable weather. From him our Thursday derives its name, anciently Thorsday. 6. Friga represented both sexes, holding a drawn sword in the right hand, and a bow in the left. She was generally taken for a goddess; and was reputed the bestower of peace and plenty, love and amity. Her day of worship was called by the Saxons Frigedeag, now Friday; but the habit and weapons of this figure have a resemblance to Diana rather than to Venus. 7. Seater, or Crodo, stood on the prickly back of a perch. He was thin-visaged and long-haired, with a long beard, bare-headed and bare-footed, carrying a pail of water in his right hand, wherein are fruits and flowers, and holding up a wheel in his left, and his coat tied with a long girdle. His standing on the sharp fins of this fish signified to the Saxons that by worshipping him they should pass through all dangers unhurt: by his girdle flying both ways was shown the Saxon freedom; and by the pail, with fruit and flowers, was denoted that he would nourish the earth. From him comes Saturday. There is a striking resemblance between those deities and the seven chief gods of the Romans, from whom their days were also named; viz. Apollo, Diana, Mars, Mercury, Jupiter, Venus, and Saturn.

Such were the principal gods of the northern nations: but these had also inferior deities, who were supposed to have been translated into heaven for their heroic deeds, and whose greatest happiness consisted in drinking ale out of the skulls of their enemies in the hall of Woden. See MYTHOLOGY.

There is, however, one species of idolatry more wonderful than any thing that has yet been mentioned, viz. the worship of brutes, reptiles, and vegetables, among the Egyptians. To the Greeks and Romans, as well as to us, that superstition appeared very monstrous. Brute worship prevailed at so early a period in Egypt, that the philosophers of antiquity seem to have had no advantage over the moderns in their researches into its origin; and among the modern hypotheses those of Mosheim and Warburton appear the most probable. The former of these learned writers attributes it to the policy of the prince and the craft of the priest. The latter contends, with much earnestness and ingenuity, that it resulted from the use of hieroglyphic writing. We believe that both these causes contributed to the production of so monstrous an effect: and that the use of hieroglyphics, as sacred symbols, completed that wonderful superstition which the craft of the priest and the policy of the prince had begun. For the arguments on each side, we must refer the reader to these learned authors. We shall here only observe that Mosheim's account of the origin and progress of that species of idolatry which was peculiar to Egypt, and with respect to the rise of brute worship, appears perfectly satisfactory. But the Egyptians worshipped several species of vegetables; and, to account for this ridiculous idolatry, we must call in the aid of Warburton's hypothesis.

That learned author having proved that hieroglyphic writing was prior to alphabetical characters; and having traced this kind of writing from such rude pictures as those which were in use among the Mexicans, through all the different species of what he calls euriologic, tropical, and symbolic hieroglyphics (see HIEROGLYPHICS), shows, by many quotations from ancient authors, that the Egyptian priests wrapt up their theology in the symbolic hieroglyphics, after alphabetic characters had banished them from the transactions of civil life. These symbols were figures of animals and vegetables, denoting from analogy certain attributes of their divinities; and when the vulgar, forgetting this analogy, ceased to understand them as a species of writing, and were yet taught to consider them as sacred, they could not but view them as emblems of the divinities whom they adored. But, if rude sculptures upon stone could be emblematical of the divinities, it was natural to infer that the animals and vegetables themselves must be emblems more striking and more sacred. Hence, the learned author thinks, arose that wonderful superstition peculiar to the Egyptians. These two hypotheses combined together seem to account sufficiently for the idolatry of Egypt, monstrous as it was.

To this account of the origin of brute-worship we are aware that an objection will occur; viz. that 'brute worship was not peculiar to Egypt. The Hindoos have a religious veneration for the cow and the alligator.' But there is every reason to believe that brute-worship was introduced into India by a colony of Egyptians at a very remote period. That between these two nations there was an early intercourse is universally a-

lowed. Sesostris made an inroad into India, and conquered part of the country. Brute worship might also be introduced into Hindostan by those vast colonies of Egyptians who took refuge in that country from the tyranny and oppression of the shepherd kings. That such colonies did settle in India is undeniable, from monuments still remaining in that country of forms which could hardly have occurred to a native of Asia, though they are very natural as the workmanship of Africans. This is confirmed by MSS. lately discovered by members of the Asiatic Society.

Having thus traced the rise and progress of polytheism and idolatry, as they prevailed in the most celebrated nations of antiquity, we proceed to enquire into the real opinions of those nations concerning the nature of the gods whom they adored. And here it is evident from the writings of Homer, Hesiod, and the other poets, who were the principal theologians among the Greeks and Romans, that though heaven, earth, hell, and all the elements, were filled with divinities, there was yet an occasional acknowledgment of one who was supreme over all the rest. 'Whence each of the gods was generated,' says Herodotus, 'or whether they have all existed from eternity, and what are their *forms*, is a thing that was not known till very lately; for Hesiod and Homer were, as I suppose, not above 400 years my seniors; and they introduced the theogony among the Greeks, and gave the gods their several names.' Now Hesiod, towards the beginning of his theogony, expressly invokes his Muse to celebrate in suitable numbers the generation of the immortal gods, who had sprung from the earth, the dark night, the starry heavens, and the salt sea. He calls upon her likewise to say 'in what manner the gods, the earth, the rivers, ocean, stars, and firmament, were generated, and what divine intelligences had sprung from them of benevolent dispositions towards mankind.' From his invocation, it is evident that the poet did not consider the gods of Greece as self-existent beings; neither could he look upon them as creatures; for of creation the ancient Greeks had no conception; but he considered them as emanations, coeval with the earth and heavens, from some superior principles; and by the divine intelligences sprung from them it is certain he understood benevolent dæmons. The first principles of all things, according to him, were Chaos, and Tartarus, and Love; of which only the last was active, unless by Tartarus he meant a self-existent principle of evil; in which case his creed will be the same with that of the ancient Magi. Hesiod is said to have taken his theology from Orpheus; and his doctrine concerning the generation of the gods is the same with that taught in certain verses usually attributed to Orpheus, in which Love and Chaos are thus brought together.

With the theology of Homer our readers are so well acquainted that we need no quotations to prove that this great poet held Jove to be the father of gods and men: and the doctrine of the poets was the creed of the vulgar Greeks and Romans. It does not indeed appear that in the system of vulgar paganism the subordinate gods were accountable to their chief for any part of their conduct, except when they transgressed the limits of the provinces assigned them. Venus might conduct the amours of heaven and earth in whatever manner she pleased; Minerva might communicate or withhold wisdom from any individual with or without reason; and, in Homer's battles, the gods separated into parties, and supported the Greeks or Trojans according as they favored the one or the other. Jove indeed sometimes called them to order; but his interference was thought partial and tyrannical, rather than just. The vulgar Greeks, therefore, although they admitted but one, or at most two self-existent principles, did not consider the inferior divinities as mediators between them and the supreme, but as gods to whom their worship was on certain occasions to be ultimately directed.

The creed of the philosophers seems to have been different. Such of them as were theists, and believed in the administration of Providence, admitted of but one God, to whom worship was ultimately due; and they adored the subordinate divinities as his children and ministers, by whom the course of providence was carried on. With respect to the origin of those divinities Plato is very explicit. Cicero teaches the same doctrine with Plato concerning the gods; and Maximus Tyrius, who seems to have understood the genius of polytheism as thoroughly as any man, has a passage in which we have a plain acknowledgment of one supreme God, the sovereign of the universe, and of three inferior orders of gods, who were his ministers in the government of the world; and he calls these intelligences θεους, θεου παιδας και φιλους, gods, the sons and friends of God. 'Amidst war, contention, and discord, you may find every where throughout the world one uniform law and opinion, that there is one God, the king and father of all, and many gods, the sons of god, who reign with God. These things both the Greek and barbarian affirm, both the inhabitants of the continent and of the sea coast, both the wise and the unwise.'

This account of philosophical polytheism receives no small support from the Asiatic Researches of Sir William Jones. 'It must always be remembered,' says that accomplished scholar, 'that the learned Indians, as they are instructed by their own books, acknowledge only one Supreme Being, whom they call Brahme, or the Great One, in the neuter gender. They believe his essence to be infinitely removed from the comprehension of any mind but his own; and they suppose him to manifest his power by the operation of his divine spirit, whom they name Vishnou, the Pervader, and Nérâyan, or moving on the waters, both in the masculine gender, whence he is often denominated the first male. When they consider the divine power as exerted in creating, or giving existence to that which existed not before, they call the deity Brahma; when they view him in the light of destroyer, or rather changer of forms, they give him a thousand names, of which Siva, Iswara, and Mahadeva, are the most common; and, when they consider him as the preserver of created things, they give him the name of Vishnou. As the soul of the world, or the pervading mind, so finely described by Virgil, we see Jove represented by several

Roman poets; and with great sublimity by Lucan in the well known speech of Cato concerning the Ammonian oracle. 'Jupiter is wherever we look, wherever we move.' This is precisely the Indian idea of Vishnou; for, since the power of preserving created things by a superintending providence belongs eminently to the godhead, they hold that power to exist transcendently in the preserving member of the triad, whem they suppose to be every where always, not in substance, but in spirit and energy.' This supreme god Brahme, in his triple form, is the only self-existent divinity acknowledged by the philosophical Hindoos. The other divinities, Genesa, Indra, Cuvera, &c., are all looked upon either as his creatures or his children, and of course are worshipped only with inferior adoration.

It was upon this principle, of the generation of the gods, and of their acting as ministers to the supreme Numen, that all the philosophers of Greece, who were not atheists, worshipped many divinities, though they either openly condemned or secretly despised the traditions of the poets respecting the amours and villanies of Jupiter, Venus, Mercury, &c. But a theogony was not peculiar to the Greeks, Romans, and the Hindoos; it made part of every system of polytheism. Even the Egyptians themselves, the grossest of all idolaters, believed in one self-existent God, from whom all their other divinities descended by generation. This appears from the writings of Horus, Apollo, Jamblicus, Porphyry, and many other ancient authors; but if the inscription on the gates of the temple of Neith in Sais, as we have it from Plutarch and Proclus, be genuine, it will admit of no doubt. This famous inscription, according to the last of these writers, was to this purpose:—'I am whatever is, whatever shall be, and whatever hath been. My veil no man hath removed. The offspring which I brought forth was the sun.'

The Persian magi believed in two self-existent principles, a good and an evil: see MAGI. But Diogenes Laertius says, they held that fire, earth and water, which they called gods, were generated of these two. Zoroaster, the reformer of the Persian theology, taught that 'Ormuzd was as far removed from the sun as the sun is removed from the earth.' According to this modification of magianism, the sun was one of the generated gods, and held the office of vicegerent to the invisible fountain of light and good. Still, however, a self-existent principle of evil was admitted; but though he could not be destroyed or annihilated, by any power, it was believed that he would at last be completely vanquished by Ormuzd, and rendered thenceforward incapable of producing any mischief.

From this short view of polytheism, as we find it delineated by the best ancient writers, we may conclude that the whole pagan world believed in but one, or at most two, self-existent gods, from whom they conceived all the other divinities to have descended in a manner analogous to human generation. The vulgar pagans, however, considered each divinity as supreme and unaccountable within his own province, and therefore entitled to worship which rested ultimately in himself. The philosophers, on the other hand, seem to have viewed the inferior gods as accountable for their conduct to him who was their sire and sovereign, and to have paid to them only that inferior kind of devotion which the church of Rome pays to departed saints. The vulgar pagans were sunk in the grossest ignorance, from which statesmen, priests, and poets, exerted their utmost influence to keep them from emerging; for it was a maxim which, however absurd, was universally received, that 'there were many things true in religion which it was not convenient for the vulgar to know; and some things which, though false, it was yet expedient that they should believe.' The polytheism and idolatry of the vulgar, therefore, were their misfortune rather than their fault. But the philosophers were wholly 'without excuse; because that, when they knew God, they glorified him not as God, neither were thankful, but became vain in their imaginations, and their foolish heart was darkened. Professing themselves wise, they became fools, and worshipped and served the creature more than the Creator, who is God blessed for ever.' Rom. i. 20—25.

The philosophers, it is never to be forgotten, converted in no one instance a single village either from idolatry or vice; on the contrary, they patronised both by their maxims, and countenanced them by their example. Their ignorance was great, but their dishonesty greater. 'Reason,' says Leland, ably, 'may be, and has been of great use, when under the conduct of divine revelation, and making use of the light which that affords; but when, trusting to its own force, it has affected independency, and endeavoured to strike out new paths, it has often made wild work in religion, and plunged men into atheism, scepticism, and infidelity, on the one hand, or into idolatry, superstition, and numberless varieties of error, on the other.'

POLYTRICHUM, in botany, golden maidenhair, a genus both of the natural and artificial order of musci, belonging to the cryptogamia class of plants. The anthera is operculated, and placed upon a very small apophysis or articulation; the calyptra villous; the star of the female is on a distinct individual. There are three species; the most remarkable of which is P. commune, the great golden maiden-hair, frequently met with in bogs and wet places of this country. It grows in patches, the stalks erect, generally single and unbranched, from three to twelve inches, or even a yard, high. The leaves are numerous, stiff, lanceolate, acute, growing round the stalk, without order, and, if viewed with a microscope, appear to have their edges finely serrated. They are of a bright green when young and fresh, but reddish when dried or in decay: the filaments, or peduncles, are of a shining red, or orange color, from two to four inches long, arising singly from the top of the stalks, and surrounded at their base with a cylindrical

tubular vagina, or perichætium. The capsule is quadrangular, green at first, afterwards yellow, and red when ripe, having an annular pedestal, or apophysis, at its base. The operculum is flat, with a projecting point in the centre; and underneath is a whitish circular membrane, placed in the middle of the capsule's orifice, and sustained there by numerous arched threads or cilia, connected by one end to the circumference of this membrane, and by the other fastened to the ring of the anthera. The pollen is freed from the anthera or capsule through the space between the cilia. The calyptra is twofold, an internal and an external one; both of which at first entirely cover and hang over the anthera. The internal one is conical, membranaceous, and smooth; the external one is composed only of tawny hairs, connected into a sort of mat, lacerated at the base, and serving like a roof of thatch to defend the other. Besides the stalks, before described, there are commonly some others near at hand, which are destitute both of filaments and capsules, but terminated with a kind of rosaceous cup, either of a bright red or yellowish color, composed of leaves of different sizes, the outermost broad, the innermost lanceolate, growing gradually more and more fine and slender to the centre. This cup Linnæus considers as the female flower of this moss; but Haller is of opinion that it is only the gem or origin of a new stalk, which frequently rises from its centre, and this again becomes sometimes proliferous. There are two varieties; the first has much shorter stalks than the preceding, and often branched; the leaves stiffer, erect, and more crowded; in other respects the same. The other has a stalk scarcely more than half an inch high, terminated with a cluster of linear, erect, rigid leaves, for the most part entire on the edges, and tipped each with a white hair. The filament is about an inch high, and the capsule quadrangular. The female flower, or gem, is of a bright red color. The first kind, when it grows long enough for the purpose, is sometimes used in England and Holland to make brooms or brushes. Of the female sort the Laplanders, when obliged to sleep in desert places, frequently make a speedy and convenient bed. Where this moss grows thick together, they mark out, with a knife, a piece of ground, about two yards square, or of the size of a common blanket; then, beginning at one corner, they gently sever the turf from the ground, and, as the roots of the moss are closely interwoven and matted together, they by degrees strip off the whole circumscribed turf, in one entire piece; afterwards they mark and draw up another piece exactly corresponding with the first; then, shaking them both with their hands, they lay one upon the ground, with the moss uppermost, instead of a matrass, and the other over it, with the moss downwards, instead of a rug; and between them both take a comfortable nap, free from fleas and bugs, and without fear of contagious distempers. It is probable they might take the hint of making such a bed from the bear, a cohabitant of their country, which prepares his winter quarters with a large collection of this same moss. See MUSCI.

POLYXÆNUS. Sae POLYÆNUS.

POLYXENA, in fabulous history, a daughter of Priam and Hecuba, famed for beauty and accomplishments. Achilles fell in love with her, and would have married her, but Hector opposed the match. After Hector's death, he went to the temple of Apollo to marry her, but was treacherously murdered by her brother Paris with an arrow, in the heel, his only vulnerable part; whereupon Polyxena, whose affection was mutual, killed herself on his tomb. Others say she was sacrified by the Greeks to pacify his manes.

POLYXO, a priestess of Apollo's temple in Lemnos. She was likewise nurse to queen Hypsipyle. It was by her advice that the Lemnian women murdered all their husbands.

POLYXO, a native of Argos, who married Tleoptolemus, son of Hercules. She followed him to Rhodes after the murder of his uncle Licymnius; and, when he departed for the Trojan war with the rest of the Greek princes, she became the sole mistress of the kingdom. After the Trojan war Helen fled from Peloponnesus to Rhodes, where Polyxo reigned. Polyxo detained her, and, to punish her as being the cause of a war in which Tleoptolemus had perished, she ordered her to be hanged on a tree by her female servants, disguised in the habit of Furies.

POLYZELUS, an ancient Greek poet, born at Rhodes. He wrote a poem on the origin and birth of Bacchus, Venus, the Muses, &c., some verses of which are quoted by Athenæus.

POMACEÆ, from pomum an apple, the thirty-sixth order in Linnæus's Fragments of a Natural Method, the genera of which have a pulpy esculent fruit, of the apple, berry, and cherry kind. See BOTANY.

POMA'CEOUS, *adj.* Lat. *pomum.* Consisting of apples.

Autumn paint
Ausonian hills with grapes, whilst English plains
Blush with *pomaceous* harvests breathing sweets.
Philips.

PO'MANDER, *n. s.* Fr. *pomme d'amber.* A sweet ball; a perfumed ball or powder.

I have sold all my trumpery; not a counterfeit stone, not a ribbon, glass, *pomander*, or browch to keep my pack from fasting. *Shakspeare.*

They have in physic use of *pomander* and knots of powders for drying of rheums, comforting of the heart, and provoking of sleep. *Bacon.*

The sacred virgin's well, her moss most sweet and rare,
Against infectious damps for *pomander* to wear.
Drayton.

POMA'TUM, *n. s.* Lat. *pomatum.* An ointment.

I gave him a little *pomatum* to dress the scab.
Wiseman.

POMATUM is generally used in dressing the hair. It is also used as a medicine.

POMBAL (Sebastian Joseph Carvalho Mello count d'Oeyras, marquis de), the most famous of modern Portuguese statesmen, was born at Soura, in the territory of Coimbra, in 1699. He was the son of Emanuel Carvalho, a gentleman of the second class, and studied the law at the university of Coimbra. Preferring a military life he first procured a commission in the guards, but here the violence of his temper in-

volved him in errors, in consequence of which he thought proper to retire from the army. He now took up his residence at his native place, and married, in opposition to the wishes of her friends, a lady of a noble and wealthy family. Shortly after (in 1738) he obtained a new introduction to court, and through the patronage of the queen he was appointed ambassador to London. Here he became acquainted with the reciprocal interests of England and Portugal, and gained correct ideas of the power to which a free nation may attain by industry and commerce. He likewise acquired a just notion of the mercantile system, and of the measures calculated to support it. In 1745 he was recalled, and, through the influence of his patroness, was sent to Vienna, to adjust a dispute between pope Benedict XIV. and the empress Maria Theresa, relative to the patriarchate of Aquileia. His wife dying, he married the young countess Von Daun, niece of the celebrated marshal of that name; and this union established his ascendancy over the queen of Portugal, an Austrian princess. In 1750, therefore, on the death of the king, she persuaded her son, Joseph I., to appoint him secretary of state for foreign affairs. His first care was to improve the commercial resources of his country, and encourage a spirit of industry; but he also seems to have endeavoured systematically to depress the nobility, and displayed a marked dislike to the Jesuits. He was, however, proceeding to prosecute effectually various useful reforms, when the dreadful earthquake at Lisbon occurred in 1755. On this occasion he displayed the most active benevolence towards the distressed citizens, being found personally in all parts of the city assisting in and directing every measure to relieve their sufferings. His services procured him deserved respect, and the king rewarded him with the title of count d'Oeyras. In the following year he was made prime minister, and assumed a most unlimited power in every department of the state. Many of his measures were arbitrary, but the licentiousness of the age, and the character of the people, would seem to excuse, if not to justify, his proceedings. The attempt to assassinate the king, for which the duke of Aveiro and others of the nobility suffered, he openly attributed to the Jesuits; and in the month of April, 1759, he transmitted to the pope a letter from the king, in which it was stated that, if that order were any longer suffered to carry on their intrigues, the government would infallibly be overturned; that therefore it was necessary to banish them completely from the kingdom. The pontiff strongly opposed the measure; but the count was determined to carry it into execution. On the 3d of September a decree was passed, by which the Jesuits were declared rebels and traitors, and interdicted from remaining as a body in Portugal, or ever returning to it under any pretence. At first they seemed determined to set the royal authority at defiance; but by the assistance of the military they were sent on board different transports, to the number of 1854, and conveyed to the states of the church. An offer was made to the younger brethren, that they should remain at liberty in Portugal, provided they would renounce their order; but this they declined.

During the war between Portugal and Spain, the count exerted himself successfully in putting the Portuguese army and navy on a good footing; he afterwards turned his attention to the encouragement of trade and commerce; established schools of industry, and a school of commerce, where 200 pupils were admitted and taught the various branches of knowledge suited to their future destination; and introduced a thorough reform in all the seminaries of the kingdom. A new institute was also established for the education of the young nobility. A second attempt made on the king's life in December 1768, by a disappointed mule-driver, who had served in the artillery, led him to pay a still greater attention to this minister. He presented him with several valuable estates, loaded him with pensions, and at length, in 1770, conferred on him the title of marquis de Pombal. During the remainder of this reign he kept the king entirely in his power; but upon the death of the monarch, in 1777, the marquis was dismissed, but permitted to retain his titles and his income. He, however, soon found that he was an object of suspicion; his papers were sealed up, and an intimation was sent to him to retire to his estate in the country; where, having first seen all his plans relinquished or overturned, he died in May 1782, in his eighty-third year.

POMEGRAN'ATE, *n. s.* Lat. *pomum granatum.* A tree; the fruit of that tree. See below.

And Saul tarried in the uttermost part of Gibeah, under a *pomegranate* tree. 1 *Sam.* xiv. 2.

It was the nightingale, and not the lark,
That pierced the fearful hollow of thine ear,
Nightly she sings on yon *pomegranate* tree.
Shakspeare.

In times past they dyed scarlet with the seed of a *pomegranate.* *Peacham on Drawing.*

Nor on its slender twigs
Low bending be the full *pomegranate* scorned.
Thomson.

The flower of the *pomegranate* consists of many leaves placed in a circular order, which expand in form of a rose, whose bell-shaped multifid flowercup afterwards becomes a globular fruit, having a thick, smooth, brittle rind, and is divided into several cells, which contain oblong hardy seeds, surrounded with a soft pulp. *Miller.*

On her fair cheek's unfaded hue,
The young *pomegranate's* blossoms strew
Their bloom in blushes ever new. *Byron.*

POMEGRANATE. See PUNICA.

POMERANIA, a considerable province of Prussia on the Baltic, extends from long. 12° 29' to 18° 2' E., and from lat. 52° to 54° 44' N. Its form is oblong, its length (from east to west) above 200 miles: its breadth varies from thirty to sixty, and in some places eighty miles. The area is computed at 12,000 square miles. Part of it formerly belonged to Sweden; but Prussia now has possession of the whole, and of the adjacent island of Rugen. It is divided into the governments of Stettin, Stralsund, and Coslin. Population 670,000. The chief towns

	Population.		Population.
Stettin .	. 22,000	Colberg . .	4,500
Stralsund	11,200	Stolpe . . .	4,400
Stargard .	8,600	Wolgast . .	3,800
Anklam .	4,700	Coslin . . .	3,300

This is a tract of flat country, and so slight is the slope towards the sea that the rivers do not retain a sufficient current to flow, but expand into lakes, of which the Haff, of an oblong form and communicating with the Baltic, is the largest. On the other hand, towards the Baltic, the land is so low that it would be inundated, were it not protected by a range of sand-hills, and by artificial dikes. The soil is light, consisting, in various parts, of a drifting sand; but on the banks of lakes and rivers it is a dark and heavy mould. The atmosphere is often foggy, and the climate cold, but not unhealthy. The rivers are the Oder, Leba, Stolpe, Rega, Persante, Ucker, and Ihna.

Agriculture is here in a low state, the peasants, with the exception of those in Swedish Pomerania, being in a state of vassalage. Cattle breeding is the favorite occupation; and the sheep range in numerous flocks. Hogs are also reared in great number; the number of geese is also large; they are exported dried or smoked. The forests abound in game. The minerals are almost confined to marsh-iron, alum, and salt.

The woollen manufacture has received attention here, as well as those of linen, leather, iron, hardware, and glass. The exports are corn, cattle, timber, wool, wax, and dried fish. The imports sugar, coffee, and cotton goods. This country has, by the means of the Oder, a considerable transit business for Silesia and part of Brandenburgh, being the channel of export for their linen, and of import for their wine and colonial produce.

This country was originally inhabited by Gothic tribes, and invaded, in the sixth century, by a host of Vandals or Sclavonians, who settled in it. The name of Pomerania first occurs in a bull of pope Innocent, dated in 1140, for the confirmation of a newly elected bishop. After this it long formed an independent duchy, and was a component part of the German empire in the twelfth century; but in 1637 the ducal family became extinct. At that time the electoral house of Brandenburg was supposed to have the best claim to the succession; but the duchy was in the possession of the Swedes, who accordingly retained it, and Prussia was indemnified out of the secularised bishoprics. But, on the unfortunate result of the expeditions of Charles XII. turning the scale in favor of Prussia, she seized the greater part of Pomerania, and at the peace of Stockholm retained the whole except the western angle, subsequently called Swedish Pomerania. This territory was ceded by Sweden to Denmark in 1814, as an indemnity for Norway, but came soon after to Prussia, by exchange for Saxe-Lauenburg. The division of Anterior and Hinder Pomerania, which subsisted for some centuries, is now abolished.

POMERELIA, or Lesser Pomerania, is a district of the Prussian States, bounded on the north by the gulf of Dantzic, on the south by Poland, and on the west by Pomerania Proper Its form is oblong, being ninety miles in length from north to south, and about fifty in breadth. It was formerly a part of the duchy of Pomerania; but was acquired in the fourteenth century by Prussia, and subsequently by Poland; lastly, it was ceded to Prussia in 1773, and now forms part of the government of Dantzic. It commands the lower part of the Vistula.

POMEROYAL. See Pyrus.

POMET (Peter), an able druggist at Paris, born in 1658. He collected at a great expense from all countries drugs of every kind, and rendered himself celebrated by his book, entitled Histoire Generale des Drogues, which is the most complete book on the subject that has yet been printed. He died in 1699.

POMEY (Francis), a learned Jesuit, well known for his Pantheon Mysticum, which Andrew Tooke translated, and published in his own name, without once mentioning the original author's name. Pomey was well versed in Latin. He died in 1673, aged fifty-five.

POMFRET (John), an English poet, son of the rector of Luton in Bedfordshire, was born in 1667, and educated at Cambridge; after which he took orders and was presented to (Dr. Johnson says was rector of) the living of Maldon in Bedfordshire. In 1703 he went to London for institution to a more valuable piece of preferment; but, the bishop (Compton) having been induced to consider a passage in his Choice as licentious, his induction was delayed, and he in the mean time caught the small pox, and died in the metropolis, aged thirty-five. His Choice has been much read and admired. Dr. Johnson says, 'He pleases many, and he who pleases many must have merit.'

POMIF'EROUS, *adj.* Lat. *pomifer.* A term applied to plants which have large fruits, and are covered with thick hard rind.

All *pomiferous* herbs, pompions, melons, gourds, and cucumbers, unable to support themselves, are either endued with a faculty of twining about others, or with claspers and tendrils, whereby they catch hold of them. *Ray on the Creation.*

Other fruits contain a great deal of cooling viscid juice, combined with a nitrous salt; such are many of the low *pomiferous* kind, as cucumbers and pompions. *Arbuthnot on Aliments.*

POMME, or Pommette, in heraldry, is a cross with one or more balls or knobs at each of the ends.

POM'MEL, *n. s.* Fr. *pomeau;* Ital. *pomo.* A round ball or knob; the nob of a sword handle; a cushion; the fore part of a saddle.

Huram finished the two pillars and the *pommels*, and the chapiters which were on the top of the two pillars. *2 Chronicles.*

Like *pommels* round of marble clear,
Where azured veins well mixt appear. *Sidney.*

His chief enemy offered to deliver the *pommel* of his sword in token of yielding. *Id.*

Every of our novices hath learned to make no difference of men; and dare breathe in the poisonous air of Italy itself, and touch the very *pommel* of the chair of pestilence. *Bp. Hall.*

The starting steed was seized with sudden fright,
And, bounding, o'er the *pommel* cast the knight.
Dryden

POMMERCULLIA, in botany, a genus of the monogynia order and triandria class of plants; natural order fourth, gramina: CAL. bivalved, and shaped like a top; the valvula quadrifid, and bearded on the back: COR. two unequal valves; the filaments three, with long pointed antheræ; the style simple. The whole flower forms itself into a sharp point, and the corolla serves as a covering to the seed, which is long, clear, and smooth. There is only one species, viz:—P. dianthoides.

POMŒRIUM, in Roman antiquity, was, according to Livy, that space of ground, both within and without the walls, which the augurs, at the first building of cities, solemnly consecrated, and on which no edifices were allowed to be raised. Plutarch gives this account of the ceremony of drawing the pomœrium:—'They dug a trench, and threw into it the first fruits of all things, either good by custom, or necessary by nature; and, every man taking a small turf of earth of the country whence he came, they cast them in promiscuously. Then, making this trench their centre, they described the city in a circle round it. After this, the founder, yoking a bull and a cow together, ploughed a deep furrow, with a brazen ploughshare, round the bounds. The attendants took care that all the clods fell inwards, i. e. towards the city. This furrow they called pomœrium, and built the wall upon it.'—Plutarch, in this account, is to be understood as speaking of Rome.

POMŒRRIUM PROFERE, signifies to extend or enlarge a city, which could not be done by any but those who had taken away some part of an enemy's country in war. But this qualification was sometimes dispensed with. Pomœrium is quasi pone mœnia, i. e. behind the walls.

POMONA, in mythology, the tutelar deity of orchards and fruit trees. See VERTUMNUS.

POMONA, in geography, or MAINLAND, the principal of the ORKNEY ISLES, which see.

POMP, *n. s.*, POM'POUS, *adj.*, POM'POUSLY, *adv.*, POM'POUSNESS, *n. s.* Fr. *pompe*; Lat. *pompa*. Ostentation; splendor; pride; grand or showy procession; the adjective, &c., corresponding.

> Take physic, *pomp*,
> Expose thyself to feel what wretches feel.
> *Shakspeare.*

> The bright *pomp* ascended jubilant. *Milton.*

> All eyes you draw, and with the eyes the heart;
> Of your own *pomp* yourself the greatest part.
> *Dryden.*

> Whate'er can urge ambitious youth to fight,
> She *pompously* displays before their sight. *Id.*

Such a numerous and innocent multitude, clothed in the charity of their benefactors, was a more beautiful expression of joy and thanksgiving than could have been exhibited by all the *pomps* of a Roman triumph. *Addison's Guardian.*

The English and French raise their language with metaphors, or by the *pompousness* of the whole phrase wear off any littleness that appears in the particular parts. *Addison.*

An inscription in the ancient way, plain, *pompous*, yet modest, will be best. *Atterbury to Pope.*

> What flatt'ring scenes our wand'ring fancy wrought,
> Rome's *pompous* glories rising to our thought.
> *Pope.*

> What is the *pomp* of learning? the parade
> Of letters and of tongues? Even as the mists
> Of the gay morn before the rising sun,
> To pass away and perish. *Kirke White.*

POMPADOUR (Jean Antoinette Poisson marquise de), the celebrated mistress of Louis XV., was born in 1722. Voltaire says she was the daughter of a farmer at Ferté sous Jouare, whose wife becoming the mistress of Lenormand de Tournehem, a farmer-general, the mother promoted her daughter's marriage with M. Lenormond d'Etisle, nephew of Tournehem, and afterwards procured her introduction to the king. She succeeded in Louis's favor the duchess de Chateauroux, who died in 1744: in 1745 she was created marchioness of Pompadour. Her influence was used certainly in promoting the fine arts, which she herself cultivated with considerable success, and a great part of her ill-acquired wealth was lavished on books, paintings, and curiosities. But her extravagance was unbounded. She obtained a pension of 240,000 francs, and in 1756 the place of lady of the palace to the queen. She frequently interfered in the public affairs; and the seven years' war with Prussia, is said to have been one of her measures. Her death took place April 14th, 1764.

POMPEII AND HERCULANEUM. These two ancient Roman cities, near the modern Naples, were overwhelmed by the same eruption of Vesuvius, A. D. 79. It buried them both some feet deep under showers of ashes, pumice-stone, &c. Of this eruption, in which the elder Pliny lost his life, his nephew, the younger Pliny, gives the following account, in a letter to Tacitus the historian:—'To TACITUS.—Your request that I would send you an account of my uncle's death, in order to transmit a more exact relation of it to posterity, deserves my acknowledgments; for if this accident shall be celebrated by your pen, the glory of it, I am well assured, will be rendered for ever illustrious. And notwithstanding he perished by a misfortune, which, as it involved at the same time a most beautiful country in ruins, and destroyed so many populous cities, seems to promise him an everlasting remembrance; notwithstanding he has himself composed many and lasting works; yet I am persuaded the mentioning of him in your immortal writings will greatly contribute to eternize his name. Happy I esteem those to be, whom Providence has distinguished with the abilities either of doing such actions as are worthy of being related, or of relating them in a manner worthy of being read; but doubly happy are they who are blessed with both these uncommon talents; in the number of which my uncle, as his own writings and your history will evidently prove, may justly be ranked. It is with extreme unwillingness, therefore, that I execute your commands; and should indeed have claimed the task, if you had not enjoined it. He was at that time with the fleet under his command at Misenum. On the 23d of August, about one in the afternoon, my mother desired him to observe a cloud which appeared of a very unusual size and shape. He had just returned from taking the benefit of the sun, and after bathing himself in cold water, and taking a slight repast,

had retired to his study: he immediately arose and went out upon an eminence from which he might more distinctly view this very uncommon appearance. It was not at that distance discernible from what mountain this cloud issued, but it was found afterwards to ascend from mount Vesuvius. I cannot give you a more exact description of its figure than by resembling it to that of a pine-tree; for it shot up a great height in the form of a trunk, which extended itself at the top into a sort of branches; occasioned, I imagine, either by a sudden gust of air that impelled it, the force of which decreased as it advanced upwards; or the cloud itself, being pressed back again by its own weight, expanded in this manner. It appeared sometimes bright, and sometimes dark and spotted, as it was either more or less impregnated with earth and cinders. This extraordinary phenomenon excited my uncle's philosophical curiosity to take a nearer view of it. He ordered a light vessel to be got ready, and gave me the liberty, if I thought proper, to attend him. I rather chose to continue my studies; for, as it happened, he had given me an employment of that kind. As he was coming out of the house, he received a note from Rectina, the wife of Bassus, who was in the utmost alarm at the imminent danger which threatened her; for, her villa being situated at the foot of mount Vesuvius, there was no way to escape but by sea; she earnestly intreated him therefore to come to her assistance. He accordingly changed his first design, and what he began with a philosophical, he pursued with an heroical turn of mind. He ordered the galleys to put to sea, and went himself on board with an intention of assisting not only Rectina, but several others; for the villas stand extremely thick upon the beautiful coast. When hastening to the place from which others fled with the utmost terror, he steered his direct course to the point of danger, and with so much calmness and presence of mind as to be able to make and dictate his observations upon the motion and figure of that dreadful scene. He was now so nigh the mountain that the cinders, which grew thicker and hotter the nearer he approached, fell into the ships, together with pumice-stones, and black pieces of burning rock; they were likewise in danger not only of being a-ground by the sudden retreat of the sea, but also from the vast fragments which rolled down from the mountain, and obstructed all the shore. Here he stopped to consider whether he should return back again, to which the pilot advising him: 'Fortune,' said he, 'befriends the brave: carry me to Pomponianus.' Pomponianus was then at Stabiæ, separated by a gulf which the sea, after several insensible windings, forms upon that shore. He had already sent his baggage on board; for though he was not at that time in actual danger, yet being within the view of it, and indeed extremely near, if it should in the least increase, he was determined to put to sea as soon as the wind should change. It was favorable, however, for carrying my uncle to Pomponianus, whom he found in the greatest consternation: he embraced him with tenderness, encouraging and exhorting him to keep up his spirits; and the more to dissipate his fears, he ordered, with an air of unconcern, the baths to be got ready; when, after having bathed, he sat down to supper with great cheerfulness, or at least (what is equally heroic) with all the appearance of it. In the mean while the eruption from mount Vesuvius flamed out in several places with much violence, which the darkness of the night contributed to render still more visible and dreadful. But my uncle, in order to sooth the apprehensions of his friend, assured him it was only the burning of the villages, which the country people had abandoned to the flames; after this he retired to rest, and it is most certain he was so little discomposed as to fall into a deep sleep; for being pretty fat, and breathing hard, those who attended without actually heard him snore. The court which led to his apartment being now almost filled with stones and ashes, if he had continued there any time longer, it would have been impossible for him to have made his way out; it was thought proper therefore to awaken him. He got up and went to Pomponianus and the rest of his company, who were not unconcerned enough to think of going to bed. They consulted together whether it would be most prudent to trust to the houses, which now shook from side to side with frequent and violent concussions; or fly to the open fields, where the calcined stones and cinders, though light indeed, yet fell in large showers, and threatened destruction. In this distress they resolved for the fields, as the less dangerous situation of the two; a resolution which, while the rest of the company were hurried into it by their fears, my uncle embraced upon cool and deliberate consideration. They went out then, having pillows tied upon their heads with napkins; and this was their whole defence against the storm of stones that fell round them. Though it was now day every where else, with them it was darker than the most obscure night, excepting only what light proceeded from the fire and flames. They thought proper to go down farther upon the shore, to observe if they might safely put out to sea, but they found the waves still run extremely high and boisterous. There my uncle having drunk a draught or two of cold water, threw himself down upon a cloth which was spread for him, when immediately the flames and a strong smell of sulphur, which was the forerunner of them, dispersed the rest of the company and obliged them to arise. He raised himself up with the assistance of two of his servants, and instantly fell down dead; suffocated, as I conjecture, by some gross and noxious vapor, having always had weak lungs, and frequently subjected to a difficulty of breathing. As soon as it was light again, which was not till the third day after this melancholy accident, his body was found entire, and without any marks of violence upon it, exactly in the same posture that he fell, and looking more like a man asleep than dead. During all this time my mother and I, who were at Misenum—But as this has no connexion with your history, so your enquiry went no farther than concerning my uncle's death; with that,

therefore, I will put an end to my letter; suffer me only to add, that I have faithfully related to you what I was either an eye-witness of myself, or received immediately after the accident happened, and before there was time to vary the truth. You will choose out of this narrative such circumstances as shall be most suitable to your purpose; for there is a great difference between what is proper for a letter, and a history; between writing to a friend, and writing to the public. Farewell.'

All memorials of the devoted cities were lost; and discussions on the places they had once occupied were excited only by some obscure passages in the classical authors. Six successive eruptions had contributed to lay them still deeper under the surface. But, after sixteen centuries had elapsed, a peasant, in 1711, in digging a well beside his cottage, obtained some fragments of colored marble, which attracted attention. Regular excavations were made under the superintendance of Stendardo, a Neapolitan architect; and a statue of Hercules of Greek workmanship, and also a mutilated one of Cleopatra, were withdrawn from what was afterwards proved to be a temple in the centre of the ancient HERCULANEUM, to which, as it was first discovered, we shall first direct our attention.

Twenty or thirty years afterwards the king of the two Sicilies directed a complete search to be made among the remains of the subterraneous city, and the antiquities to be preserved. The precise extent of Herculaneum cannot be ascertained, though we know that it was a city of the second order. All the streets run in right lines; they are paved with blocks of lava; and there is for the most part an elevated foot-path along the sides for the convenience of pedestrians. The houses, whose exterior does not seem to have been ornamental or even regular, consist only of one story built of brick. The walls of some are covered with colored stucco, upon which are executed paintings in fresco. From the general appearance of the different edifices, we may safely conjecture that the volcanic matter consisted of very fine dust or ashes, which fell in repeated showers, until the city was totally buried under it. Indeed, it was so fine, that the most perfect impressions of the objects thus covered were imprinted on it; and, on their being now removed, the cavity may serve for a plaster or metallic cast. By this means innumerable articles were preserved entire, and scarcely displaced from their original position.

The remains of several public buildings have been discovered, which have possibly suffered from subsequent convulsions. Among these are two temples, one of them 150 feet by sixty, in which was found a statue of Jupiter. A more extensive edifice stood opposite to these, forming a rectangle of 228 feet by 132, supposed to have been appropriated for the courts of justice. The arches of a portico surrounding it were supported by columns; it was paved within with marble; the walls were painted in fresco; and bronze statues stood between forty-two columns under the roof.

The theatre was nearly entire; very little had been displaced; and we see in it one of the best specimens extant of the architecture of the ancients. It seems to have had two principal gates, with inscriptions over the architraves of each, besides seven entrances, called vomitoria, communicating with the benches. Many columns and pilasters, with labored entablatures, appeared in the proscenium, and some bronze and marble statues. The walls were covered with paintings in arabesque, and the floor paved with marble. Twenty-five rows of high and wide marble benches accommodated the audience; which, rising gradually above each other, gave a full and distinct view of the arena below. It would contain 10,000 persons, and was rich in antiquities. Statues occupying niches represented the muses; scenic masks were imitated on the entablatures; and inscriptions were engraved on different places. A metallic car was found with four bronze horses attached to it, nearly of the natural size; but all in a state of decay. A beautiful white marble statue of Venus, only eighteen inches high, in the attitude of the famous Venus de Medicis, was recovered; and in the immediate vicinity was found a colossal bronze statue of Vespasian, filled with lead, which twelve men were unable to move; and an inscription about twelve Neapolitan palms in length, as follows:—

IMP CAESAR, VESPASIANVS AVG, PONTIF, MAX
TRIB, POT VII · IMP · XVII · P. P COS · VII · DESIGN · VIII
TEMPLVM, MATRIS, DEVM, TERRA MOTV, CONLAPSVM, RESTITVIT.

Remarkably few skeletons have been found in this city, though many occur in the streets of Pompeii; but one appears near the threshold of a door, with a bag of money in its hand, as if in the attitude of escaping.

The exfodiation was prosecuted along the walls of the buildings, turning the corners, and entering by the doors and windows as they occurred. Two marble equestrian statues of the finest workmanship, which had been erected in honor of the two consuls, Balbus and son, were found opposite to the theatre; and in prosecuting the researches into the public edifices and private houses, or even through the streets, the workmen met with many things worthy of observation. A well, now containing good water, was seen surrounded by a parapet, and covered by an arch which had excluded the ashes. A capacious bath, of a circular form, was penetrated, and also repositories of the dead, still more ancient than the overthrow of Herculaneum. Numerous sacrificial implements, however, such as pateræ, tripods, cups, and vases, were recovered in excellent preservation, and even some of the knives with which the victims are conjectured to have been slaughtered.

Articles in vast variety were obtained from the houses, wherein the beams appeared as if converted to charcoal; but it is to be observed that all the remains of wood exhibit the same aspect to the very heart.

If the subjects recovered from Herculaneum be classed according to their value, the statues should be enumerated first. Of these some are

colossal, some of the natural size, and some in miniature; and the materials either clay, marble, or bronze. They represent divinities, heroes, or distinguished persons; and in the same substances, especially bronze, there are the figures of many animals. There are two statues seven feet high of Jupiter, and a woman in clay; and two of gladiators, about to combat, in bronze, are much admired. The same may be said of Nero in bronze, naked and armed as a Jupiter Tonans, with a thunderbolt in his hand. A Venus pudica of white marble, in miniature, is extremely beautiful, and also the statue of a female leaving the bath. In the year 1758 a fine bronze statue of a naked Mercury was discovered; and, in the course of the excavations beyond the confines of the city, a Silenus with a tiger was found, which had formerly adorned a fountain. Several fauns of bronze, with vases on their shoulders, were obtained in the vicinity of Silenus; and it is singular to observe that the younger figures have silver eyes, a disagreeable deformity sometimes adopted in marble statues. The figure and attitude of a drunken faun, stretched on a lion's hide, and supported by a skin of liquor, presents all the vacuity of thought and sensation of animal pleasure which accompany ebriety; another faun asleep, as large as life, presents a state of absolute repose. There is also a bronze equestrian statue of an armed Amazon, only sixteen inches high. There are many elegant statues of the goddesses and graces only eight or ten inches in height, and we likewise see some of the monstrous Egyptian divinities with which the Herculaneans were acquainted. Several fine busts, or simple heads of the ancient philosophers, as Zeno or Epicurus, stood in the houses, the name being inscribed below or on a pedestal. Bas reliefs likewise occurred, but few coins or medals. Gold coins of Augustus were found, and silver medallions, two or three inches in diameter, bearing uncertain devices.

The ancient pictures of Herculaneum are of the utmost interest, not only from the freshness and vividness of color, but from the nature of the subjects they represent. All are executed in fresco; they are exclusively on the walls, and generally on a black or red ground. It has been supposed, from passages in the classics, that the ancients used only four colors, white, black, yellow, and red; but here are added blue and green. Every different subject of antiquity is depicted here; deities, human figures, animals, landscapes, foreign and domestic, and a variety of grotesque beings. One of larger size found in a temple, and the most celebrated, represents Theseus vanquishing the minotaur, which lies stretched at his feet, with the head of a bull and the body of a man. A female, supposed to be Ariadne, and three children, form part of the group. This, along with a picture composed of several figures as large as life, of which Flora is the most conspicuous, adorned a temple of Hercules; each is six or seven feet high and five broad. Another represents Chiron teaching Achilles the lyre; and female centaurs are seen suckling their young. The interior of a shoemaker's shop is exposed on a smaller scale; a feast, baskets of fruit, a grasshopper driving a parrot yoked to a car, a cupid guiding swans in the same manner, and many allegorical subjects are represented. The king, desirous of preserving these pictures, directed them to be sawn out of the walls, after which they were put in shallow frames and kept in the museum.

It is extraordinary that numbers of perishable substances should have resisted the corrosions of time. Many almonds in the shells, imprinted with all the lines and furrows characterising their ligneous envelope; figs; and some kinds of wild apples, and a sort of pine cone yet growing in the woods of Italy, the seeds of which are now used for culinary purposes, were dug out of the ruins of Herculaneum. Grain, such as barley, and also beans and peas, remained entire, of a black color, and offering resistance to pressure. The stones of peaches and apricots are common, thus denoting the frequency of two trees, reputed indigenous in America and Persia. But what is still more singular, a loaf, stamped with Roman characters, the baker's name, or the quality of the wheat, was taken from an oven, and was apparently converted to charcoal. After such an amazing lapse of time, liquids have been found approaching to a fluid state; and a phial of oil, conceived to be that of olives, is yet white, greasy to the touch, and emits the smell of rancid oil. An earthen vase was found in the cellars containing wine, which now resembles a lump of porous dark violet-colored glass. There is, however, great difficulty in comprehending how this change should have taken place, though the ancients used very thick wines. Eggs are also said to have been found whole and empty.

An entire set of kitchen furniture has been collected, which displays several utensils exactly similar to our own. The copper pans, instead of being tinned, are coated internally with silver, and these have not been attacked by verdigris. Here is a large brass caldron, three feet in diameter, and fourteen inches deep, an urn or boiler for hot water similar to those on our tables, having also a cylinder in the centre for a heater. There are pestles and mortars, and all kinds of implements for cutting out and figuring pastry; and in short a complete culinary apparatus. Utensils of finer quality, which had been employed at tables, have likewise been collected, as silver goblets and vases, silver spoons, and the remnants of knives. But from the absence of forks, both among the other remains and in pictures, it is probable that their invention and common use are to be dated several centuries later.

Several articles belonging to personal ornament and decoration occurred; and two silver bodkins, eight inches in length, with which the Roman ladies pinned up their hair, are preserved, the end of one appropriately sculptured with a Venus adjusting her tresses before a looking-glass, held by Cupid. Gold armlets, bracelets, necklaces, with pieces of plate gold suspended to them as a locket, are preserved. Small nets also with fine meshes, which some have supposed the ladies employed to tie up their hair; and others of coarser texture, which must have been used for other purposes. Very

few jewels are discovered, which favors the idea of the inhabitants having had time to escape. There was a wooden comb, with teeth on both sides, closer on one of them than on the opposite; and portions of gold lace fabricated from the pure metal. Sandals of laced cords are seen, and a folding parasol, absolutely similar to what we esteem a modern invention, was likewise discovered. We seem to have improved principally upon the Romans, in hardware and cutlery. Their locks and keys, scissors and needles, are very clumsy articles, and their seals, rings, and necklaces, look as if they had been made at the blacksmith's forge. The toilets of the ladies, too, were not so elegantly furnished with nick-nacks in those days. Their combs would scarcely compare with those which we use in our stables; and there is nothing that would be fit for a modern lady's dressing case.

The weight of the steel-yard is generally the head of an emperor. There is a sun-dial, the gnomon of which is the hinder part of a pig, with the tail sticking up to cast the shadow. The tesseræ, or tickets of admission to the theatres, are of ivory, one has the name of the poet Æschylus written on it in Greek characters.

There is kept in the museum a case of surgeon's instruments complete, with pincers, spatulæ, and probes; also a box supposed to have contained unguents; and pieces of marble employed in braying pharmaceutical substances. A variety of carpenters' and masons' tools were found, much resembling our own; and bolts and nails all of bronze.

Different balances appear, of which the most common is analogous to the Roman steelyard; but those with flats for scales, though wanting the needle, are likewise seen. The weights are either of marble or metal, of all gradations up to thirty pounds; and from the marks exhibited by a set, well made of black marble, in a spherical shape, it is supposed the pound was divided into eight parts. There are pocket long measures, folding up like our common foot rule.

The various implements for writing repeatedly occurred; and among the pictures is a female apparently listening to dictation. That the ancients were acquainted with the art of making glass is proved by the varieties discovered in these exfoliations. Considerable numbers of phials and bottles, chiefly of an elongated shape, are preserved; they are of unequal thickness, much heavier than glass of ordinary manufacture, and of a green color. Vessels of cut white glass have been found, and also white plate glass, which antiquaries suppose was used in lining chambers called cameræ vitreæ. Colored glass or artificial gems, engraved, frequently occur; and the paintings exhibit crystal vessels. The beauty and variety of the vases have attracted particular notice, and they serve as excellent models for the moderns; for all the skill of the ancient artists seems to have been exhausted in their execution. There is one preserved, four feet in diameter, of fine white marble; others are of earthenware or silver, and the majority of bronze or copper. Some are low, wide, and flat; others tall and narrow, plain, fluted, or sculptured. Sacrificial vases were supported on tripods, whose construction seems to have been attended with equal care. Some of the latter are richly sculptured with real and imaginary figures of men and animals. One is ornamented with three lions' heads, and is supported by as many paws; another rests on three Priapeian satyrs of elegant workmanship. The god of the gardens seems to have been treated with peculiar regard by the Herculeans. He appears with all his attitudes of every possible variety, figure, and dimensions, in tripods, lamps, and household utensils. Several tripods are very ingeniously constructed, so that the feet may be closed or expanded by double sets of hinges. Endless diversity and infinite elegance are displayed in the lamps. Sometimes a lamp appears as a shell, sometimes as a bird; then a human figure or resembling a quadruped. The vases, lamps, and tripods, were particularly used in sacrifices, several of which are represented in the pictures; and, among others, are sacrifices to the Egyptian deities.

In regard to sports and pastimes, numerous remains render us familiar with those of the ancients. Here we find dice, with the same disposal of points on a cube; and dice boxes of bone or ivory, like those now used, besides some of a flattish shape. Several are false, being loaded on one side, and the manner of throwing the dice appears on a picture. No musical instruments were found but the sistrum, which we imperfectly understand; cymbals and flutes of bone or ivory are yet obtained. However, a concert is represented on a picture sixteen inches square, containing a lyrist, a player on a double flute, probably by a mouth-piece, and a female apparently singing from a leaf of music; besides other two figures. Several theatrical masks, of different fashions were found in clay and metal along with moulds for their formation.

It is to be observed in general, with regard to the numerous articles relative to this brief detail, that the quality of the statues infinitely exceeds that of the pictures; and that the vases, and tripods, lamps and candelabra, are frequently of the finest workmanship. Of many, once complete, only fragments at this day remain; and while gold, silver, bronze, or clay remain entire, iron has altogether wasted away.

After a vast collection of antiquities had been made, the king resolved on publishing a laborious and expensive work, containing engravings of those which appeared most curious. In the course of thirty-eight years, from 1754 to 1792, this was accomplished in nine folio volumes, including the pictures, bronzes, lamps, and candelabra. The first is devoted to a catalogue, five to pictures, two to the bronzes, and one to the lucerne. No fewer than 738 pictures are named in the catalogue, and the other articles are proportionably numerous. The work was, with royal munificence, presented to the principal public libraries in Europe; but, owing to the succession of the king of the Sicilies to the crown of Spain, it is seldom to be seen complete.

In penetrating an apartment of a villa, in the neighbourhood of Herculaneum, a number of supposed pieces of charcoal were carried off,

which, by accidental fracture, exposed the remains of letters, and proved so many *ancient MSS.* Here Camillo Paderni, the keeper of the museum, buried himself during twelve days, and succeeded in carrying away 337 MSS.; and, by subsequent careful research, the total number recovered now considerably exceeds 1800. The MSS. consisted of rolls, scarcely a span in length, and two or three inches in thickness, formed of pieces of Egyptian papyrus glued together. Some had a label in front, at one end of the roll, exposing the name of the work or the author, as it occupied its place in the library. But the substance of the involutions was so crushed together, the ink or pigment employed for the character had faded to such a degree, that, united to the general injury which they had received from time, and the heat to which they had been exposed, the opening of them seemed at first sight to be impracticable. Accordingly, some snapped asunder like burnt wood, others flew into fragments, or they exposed nothing. The assistance of Piaggi, a monk, was obtained from the Vatican, who invented an ingenious method of unfolding the MSS. without destruction. He made a machine, with which, by the means of certain threads, which being gummed, stuck to the back part of the papyrus, where there was no writing, he began, by degrees, to pull, while with a sort of engraver's instrument he loosened one leaf from the other, and then made a sort of lining to the back of the papyrus, with exceedingly thin leaves of onion, and with some spirituous liquor, with which he wetted the papyrus, by little and little as he unfolded it. The process was slow, but tolerably certain; and the first MS. put on the machine, being unrolled in the year 1754, proved to be a treatise in Greek capitals, written by Philodemus, an Epicurean philosopher, against music, with his name twice inscribed at the end, or interior of the roll. Similar means were adopted with other MSS., and they were partly successful. Almost the whole of the manuscripts are in Greek, very few having hitherto been found in Latin; and some of the rolls are forty or fifty feet in length. The entire surface of the roll is divided into successive columns, resembling our ordinary pages, each containing from forty to seventy lines in different MSS., this being dependent on the size of the roll; but each line is only about two inches long, and the column is no broader. In the original state, therefore, the reader held the roll before his eyes with one hand, while he unwound it with the other, as is represented by some of the Herculaneum pictures. Uncommon difficulties were experienced from the decay of the substance, from frequent blanks and obliterations within, and from the absence of punctuation. Four volumes, all by Philodemus, were successively unrolled; and, in 1760, Piaggi reached a fifth by another author, on botany. But the king was induced to order it to be withdrawn, and a sixth volume was put on the machine, where it remained thirty-six years. After twenty years preparation, the work on music was published, with illustrations by Mazzocchi, a learned Italian, under the title Herculanensium Voluminum quæ Supersunt, tomus 1. Napoli, 1793. Cicero, notwithstanding, has called the author Optimum et Doctissimum; Piso, the supposed owner of the MSS., derived his philosophy from him, and he was well skilled in the polite literature of the period. In the course of forty years from the discovery of the MSS., which were gradually withdrawn, only eighteen were unfolded. The accession of Charles, indeed, to the crown of Spain, and the death of Mazzocchi, had enervated the Herculanean Society, which was renewed in 1787, by the marquis Caracioli, and the secretary of state thenceforward placed at its head. Yet the work advanced very tardily; few persons were employed, either from the difficulty or want of interest in its prosecution; and it was perhaps totally interrupted by the political events which disturbed the peace of Europe. Meantime six of the MSS. were presented, along with other Herculaneum curiosities, to Buonaparte in 1802, by the sovereign of the Sicilies, in whose reign, indeed, we believe that both Philodemus and the volume of Lucerne were published; and ten volumes are said to have been sent, on some occasion, to the prince of Wales.

At length a proposal was made on the part of this country to co-operate with the Neapolitan government on a subject so important to the diffusion of literature as that of elucidating the Herculaneum MSS.; and Mr. Hayter, chaplain to the prince of Wales, was appointed with a regular commission to superintend their subsequent development. A parliamentary grant of £1200 was next obtained to aid its prosecution; and Mr. Hayter, having commenced his operations under the most favorable auspices in 1802, employed thirteen persons in unrolling, deciphering, and transcribing. Some improvements seem to have been attempted in the evolution of the MSS. by a chemical process; but of those subjected to it, we are told 'the greatest part of each mass flew under this trial into useless atoms; besides, not a character was to be discovered upon any single piece: the dreadful odor drove us all from the museum.' Mr. Hayter continued his operations from 1802 to 1806, during which time he affirms that more than 200 papyri had been opened wholly or in part, and he calculated that the remainder would have been unrolled and copied within six years farther at latest. But as to the precise nature and description of these MSS., the accessions which literature has gained or would gain by the work, we are only informed that certain fac-similes of some books of Epicurus were engraved.

In 1806, during Mr. Hayter's operations, it became necessary to evacuate Naples; but the existing government acquainted him that the king had prohibited the removal of the MSS.; and in the flight of the court every thing was abandoned to the French, who seem to have continued the assistants in unrolling and deciphering as before. From the opposition which Mr. Hayter experienced, he could do nothing more than retire with some of the fac-similes to Palermo, where it appears he superintended engravings of them. Yet misunderstandings with the secretary of state prevented him from procuring

a complete copy of the whole, until the British ambassador interfered.

Ninety-four fac-simile copies were then obtained, partly engraved, it would seem, and partly in MSS. These were carried to England by Mr. Hayter on his final recal in 1809, and presented by the prince Regent to the university of Oxford. However, a very confused and indistinct account of the whole of this matter has reached the public, which compels us to be thus brief regarding the history of the Herculaneum MSS.

Perhaps it may ultimately be found that they are less worthy of notice than was anticipated, particularly if we are entitled to form any judgment regarding the rest from the inconsiderable portions that have already been published.

We shall now give a brief account of the smaller but more interesting of these two cities, Pompeii. At a mile from the Torre dele' Annonziata the traveller must quit the route of Salerno and turn to the right to come at the ruins of Pompeii. The first object is called the country house; thus named because it is situated without the walls of the town. This villa had two divisions, one higher than the other; columns, or rather square pillars, formed a covered gallery, which was continued round the court, and six other columns, destined probably to sustain a kind of portico. These columns or square pillars were covered with a yellowish stucco, and the pedestals were black and ornamented. The second division of the edifice was decorated with several columns, which formed a rich portico, of a proportion however sufficiently little. In general all the parts of this house were extremely close and narrow. Upon the road which passes before the door of entrance to this house, are the tracks of carriages. Near to the door have been found two skeletons; the one held a key in one hand, and in the other a purse filled with medals and precious stones. They believe that the other had carried a box, containing different valuable things found near him. Perhaps this was the master of the house and his slave, who, in running away, had taken the most precious objects, but who, when they arrived at the door, found it already encumbered with cinders, under which they have been buried. The court of the house formed a square of ninety-four feet.

In entering the court one sees a covered portico supported by six columns; on two sides it was surrounded with trees, of which there are still seen trunks and branches. Before this portico was a basin, of which they have also found the pipes of lead on the spot. At the end of the gallery was a vault of stone, which appears to have served as a cellar because there have been found there several of those vessels in which the ancients preserved their wine. Near this, is a descent into a stone cellar, very dark, and covered with stucco; it is left absolutely whole, but has been blocked up with cinders. Near the staircase which leads to this cellar have been found seven skeletons of women, whom terror, in the moment of the volcanic eruption, had no doubt carried to shelter themselves in this remote place, where they perished. They were all pressed, one near the other, in a corner near to the door, and in discovering their bones they have observed the image and form of their bodies, which were preserved in the cinders; they have there even discovered parts of their clothes. These impressions are seen still in the museum de Portici; they show there among others that of the breast of one of these women, which is so well preserved that there is the impression of a very delicate lace. There also is perceived the impression of rings, of bracelets, of necklaces, and of earrings, with which these women were adorned.

At the end of the gallery you descend by a staircase to the second division of the house, which contains several rooms more or less grand, and behind which was the garden, into which you descend also by a grand staircase. In all this part of the house they have not found a single place which can be regarded as a bed-chamber, with the exception of a kind of alcove and circular wardrobe, having three windows into the garden. This second part of the house was the most elegant. Near to the chamber of which we have been speaking, and which may be regarded as a sleeping room, was the eating parlour, and at the side was the buttery, whence you enter into a room which appears to have served as a vestry, for there they have found clothes. Another smaller court, embellished with a basin, and columns of different proportions, was near the great road, and was the entrance to the great court of the interior, where was the door by which to go out upon this great road. Near the garden are the cold bath and the vapor bath.

The fragments of columns which were near the tomb of the arch-priestess Mammia show that formerly it was more elevated than it now is; upon a square base it had a circular building ornamented with columns and marble statues. By a door you enter into the first enclosure, that is to say, into the fore court of the sepulchral monument; the tomb, correctly speaking, was surrounded with a terrace; some steps conducted to the base of it, upon which one still finds columns. Thence an opening leads into the tomb, where there are several niches, of which the principal enclosed an urn, which probably contained the ashes of Mammia. In the fore court were two open excavations; these were the entrance to two vaulted caverns, which could not have any other use than to serve for burying. Upon the wall of the sepulchral monument, and near the excavations which we have just mentioned, have been found masks of a colossal greatness; they appear not to have belonged to the tomb of Mammia, which is of a proportion much too small; they remind us of scenical masks; and many learned men have regarded this place as the burying place of the players of this town.

The entrance to Pompeii is small, and would not announce a town of great importance. On the two sides there are arcades and porticoes, which form the entrance to the ways, or paths, for the foot soldiers; they are continued on the side of the great road; but that of Pompeii is

very narrow, being but three feet wide. This agrees with the breadth of the principal road, which is but ten or twelve feet, though it is lengthened to a distance of fifteen or sixteen fathoms. In the ancient ground of the road may still be seen very obvious traces of tracks of different carriages, with four feet distance between the wheels. At the entrance is raised a square pedestal, which appears to have supported a pretty large column.

In following this principal street the form of different shops may still be recognised, notwithstanding the ravages caused by time and the earthquake. To judge from a kind of balustrade or wire lattice, which is seen at one of them, it was the shop of a dealer in perfumes and spirituous liquors; below, there is a kind of pipe or excavation in marble, but it would be difficult to assign the use of it.

'There is often an emblem, over the door of a house, that determines the profession of its former owner.—The word 'Salve,' on one, seems to denote that it was an inn, as we have, in our days, the sign of 'The Salutation.' In the outer brick-work of another is carved the phallus, a known object of religious adoration, in many countries, probably a symbol of creative power. The same device is found on the stucco of the inner court of another house, with this intimation: Hic habitat felicitas; a sufficient explanation perhaps of the character of its inhabitants.

The volcanic matter covering Pompeii being little more than an accumulation of ashes, far different from the solid lava that covers Herculaneum, about a fourth part of the former has been cleared, and the traveller finds himself in the midst of ancient buildings. It appears probable that many of the shops with which this street is bordered were taverns, in which they gave at the same time to eat, and in which they prepared warm drinks. In these buildings they have found only the most necessary utensils; but all were very well worked; there were lamps, candelabras, vessels, and kitchen utensils, weights, statues, different vessels of all sizes, in earth, in bronze, and in glass: many fragments of glass windows; small idols, women's trinkets in gold and silver; mirrors, wax tablets for writing, surgical and musical instruments; colors of all kinds; medals in gold, silver, and bronze; children's playthings, toothpicks, paint-boxes, even eatables, corn, fruits of different sorts, &c. They have found there neither statues nor busts of a great size; the best paintings have not been found so much at Pompeii as at Herculaneum.

The *temple of Isis* is without doubt the most remarkable of the ruins discovered at Pompeii. The columns with which it was surrounded are almost entirely preserved. The half of those which ornamented the peristyle have been broken, as the capitals and the pediment. The temple itself is almost entirely built with bricks, and on the outside covered with a very solid stucco. The orders are of a small proportion, which diminishes the effect the edifice would have had if it had been of a more imposing architecture. They have found in this temple all the instruments belonging to the religious ceremonies, and even the skeletons of priests, who had been surprised there, and surrounded by the showers of cinders in the middle of the occupations of their ministry. They show also their vestments, the cinders and coals upon the altars, the candelabras, many lamps, cisterns, vessels to hold the holy water, the pateræ employed in libations, a kind of kettles to preserve the intestines of the victims in; cushions upon which they placed the statue of the goddess Isis, when they offered sacrifices to her; the attributes of the divinity, with which the temple is every where ornamented, &c. Many of these vessels have the figure of an ilex, of an hippopotamus, or a lotus. The walls of the temple were ornamented with paintings relative to the worship of Isis; there have been found there, among others, the figures of priests in their habits; their vestment was of white linen, the heads of the officiating priests were shaven, and their feet were covered with a fine and light lace. It appears that, in the sanctuary of this foreign divinity, they granted also places to other divinities, for there have been found there statues of Bacchus, Venus, and Priapus. All that were transportable of these different objects have been placed in the museum de Portici. The temple had the form of a long square, and was not covered. A covered gallery supported by columns surrounded the temple; it served for a shelter in case of bad weather. In the middle was raised a small chapel, to which you are led by some steps, and which appears to have been the sanctuary of the goddess. At the bottom was probably the place where they assembled those initiated, and on the side is another cell, in which the three statues of Venus, Bacchus, and Priapus, were united in one niche. The principal entrance to the temple was on the side of the street of Pompeii; and on each side of the entrance was an altar, before a figure of the goddess, wrought in basso relievo. The grand altar upon which they sacrificed was three feet and a half high; and there have been found there ashes and bones partly broken and burnt. The principal door of the interior sanctuary consisted of two wings; they have found there still the brass hinges which have been carried to the museum de Portici. There has been found the skeleton of a priest upon this pavement near a marble table; it appears that this priest had been surprised by the volcanic eruption at the moment he was going to eat fish, for in digging they have still found the relics dispersed, and some vessels which were used to prepare this sort of food. We know, from Plutarch, that the priests of Isis might not live upon any thing but fish. The statue of the goddess in white marble was found in this sanctuary. It was placed upon a square base; and is of a very agreeable style. Near it has been found a stone table, covered with hieroglyphics: the great altar on which they sacrificed is also of an elegant form. There are still to be found there different ornaments, different fragments of columns which decorated the sanctuary, masks of baked earth, which served, at the same time, as ornaments, and to collect the rain waters. Probably the roof of the gallery was ornamented with similar masks; the open mouth served to give efflux to

the water They have found there censers or acerræ, in thin iron, serving to burn the perfumes.

Near the temple of Isis there was a spacious edifice, which, according to all appearance, has served for an apartment and place of arms to the Roman soldiers: which is the reason it has been called the soldiers' quarter. This edifice has least suffered from the earthquake, because it was low, and of a light construction.

In the quarter of the soldiery have been found almost all the walls, and nearly all the columns, entire. The form of this edifice is that of a long square, and it is surrounded by columns, and a covered gallery. This gallery communicated with several chambers or cells, which probably served as lodging rooms for the soldiers. The interior court, in length about twenty-three toises, and breadth seventeen, served probably for military exercises. The columns are of the Doric order: they have no base; they are in height eleven feet, and their diameter is eighteen inches. The gallery between the colonnade and the wall is thirteen feet seven inches wide. It served for a promenade, and, at the same time, to shelter the cells, in each of which were lodged, probably, four soldiers; for in each there are four suits of armour. These cells were not of equal dimensions: all were very small, covered with stucco, ornamented with arabesque paintings and Mosaic pavements. They were shut by means of a folding door, which opened on the inside. They received the light only by the door, and perhaps sometimes by an opening contrived in the ceiling. Among the armour which has been found there, there is, according to M. Hamilton, a helmet upon which is engraved the siege of Troy. These helmets were nearly similar to those of our ancient warriors in the times of chivalry, and were furnished with vizors. There is still found there a trumpet of brass, of a form rather singular; six ivory pipes, fixed to the lower part, unite in one single mouth-piece: they have no holes to vary the tones, but the difference of their diameters would produce different sounds, which, joined to the sound of the trumpet, must have formed a military music, very noisy, although a little monotonous. The bronze chain which was attached to it has served, no doubt, to hang it upon the shoulder. The neatness of these chambers, the paintings with which they were ornamented, the mosaic which formed their pavement, contrasts very much with the darkness which must have reigned there: but it appears that the soldiers, as well as the greater part of the inhabitants of Pompeii, passed almost the whole of their time upon the terraces and in the galleries, and returned to their chambers only to sleep, or, at the most, to take some repast. There are there also larger chambers, which are considered as the abode of the commander; because at a little distance have been found the supposed skeletons of some slaves, and of a horse loaded with clothes, stuffs, and valuable effects, which they endeavoured probably to save. At some steps further there was a peristyle ornamented with columns, with fine capitals; probably this was the side door. Very near another door leads, by means of four steps, to a place which was equally surrounded with a covered gallery, supported by Ionic columns.

To the right is the entrance of a little theatre, which is believed to have been covered; the steps only are seen, the rest is covered with ruins. Some travellers think that this edifice was an odeon. To the left of the door of the soldiers' quarter there are five little divisions, chambers, or cells, in one of which has been found a handmill; and one of the others appears to have served as a prison to the soldiers that they had put in irons. They have found there several skeletons, which appear to have belonged to the unhappy soldiers who, at the time of the eruption, were confined here in prison, without the possibility of saving themselves. Their feet were placed upon a block of wood, and underneath passed an iron which held them, and which was fixed to the block by solid nails.

The construction of the houses of Pompeii shows that this town must have been built upon a very unequal surface: it appears that it had subterranean communications with Vesuvius; for, at the present time, a cellar, which has been found under the terrace of a small house, is filled in such a manner with suffocating effluvia that it is necessary to use every precaution on entering it. When this cellar was discovered there was found there the skeleton of a woman, stretched out by the side of a large vase, near a stove which heated, at the same time, two bathing rooms and a dark rotunda, lighted only by an opening contrived in the roof. This place is equally remarkable to the naturalist and the antiquary. The vase, by the side of which the skeleton is stretched upon a heap of cinders, is three feet and a half in diameter, and appears to have served for a bathing tub. The place where the skeleton is found, and its position, evince that the person has been suddenly thrown down, which was, without doubt, the effect of an asphixy produced by the noxious effluvia. It is owing to the counsels and solicitations of M. Hamilton that travellers find this skeleton still in the place and position it was discovered in; it is certain that it makes here a much livelier impression than if it had been transported to the cabinet of Portici.

For further information on this subject see Antichità d'Ercolano, 9 vols. in folio; Bayardi Prodromo delle Antichità d'Ercolano; Notizie del Scoprimento dell' antica Citta d'Ercolano; Vinuti Descrizione delle prime Scoperte dell' antica Citta d'Ercolano; Murr de Papyris Herculanensibus; Drummond and Walpole, Herculanensia; Hayter's Letter and Report on the Herculaneum Manuscripts; Philosophical Transactions for 1751, 1753, 1754, 1755, 1756; and Sir W. Hamilton, Campi Phlegræi, p. 58. Likewise refer to the interesting article on the same subject in Dr. Brewster's Edinburgh Encyclopædia; La Lettre de Winckelmann au Comte de Brühl; La Relation des nouvelles Découvertes faites à Herculanum, by the same author; also his Six Letters, written in Italian, and addressed to M. Bianconi:—A French translation of these three works was published in Paris, in 1784, by M. Jansen. Fougeroux de Bondaroy, of the Royal Academy of Sciences, has published

Recherches sur les Ruines d'Herculanum et sur les Lumières qui peuvent en résulter, relativement à l'Etat présent des Sciences et des Arts, avec un Traité sur la Fabrique des Mosaïques, 12mo., Paris, 1770. Henri Math. August. Cramer put forth, at Halle, in 1773, Détails pour servir à l'Histoire des Découvertes d' Herculanum, avec une Préface de J. J. Rambach. Added to these, a little German work on the Ruins of Herculaneum and Pompeii, 8vo Cooke's Pompeii, in folio, contains the best account of the city that has yet been published.

POMPEY, surnamed the Great, or Cneius Pompeius Magnus, one of the greatest generals of ancient Rome, was the son of Cneius Pompeius Strabo, and Lucilia. He early distinguished himself in the field of battle, and fought with bravery and success under his father, whose courage and military prudence he imitated. In the beginning of his career, the beauty of his person gained him many admirers; and, by displaying his oratory at the bar, he obtained unbounded applause. During the civil war, between Marius and Sylla, he joined the party of the latter; and, though then only twenty-three years of age, raised three legions for him. In his twenty-sixth year he conquered Sicily, then in the power of Marius; and in forty days recovered all the territories of Africa. This rapid success astonished the Romans, and surprised even Sylla himself, who complimented him with the title of Great, and gave him a triumph, though at first he refused it. After Sylla's death, he supported himself against the remains of the Marian faction under Lepidus, and defeated them. He put an end to the war against Sertorius in Spain, and obtained a second triumph, A.A.C. 73. Soon after he was made consul, when he restored the tribunitial power to its original dignity; and in forty days cleared the Mediterranean of pirates, where they had committed dreadful depredations for many years, and had almost destroyed the naval power of Rome. He next conquered two of the most formidable enemies of Rome, Mithridates VII. of Pontus, and Tigranes, king of Armenia. After conquering the Albanians, Iberians, and some other nations scarcely known to the Romans, he received homage from twelve kings at once, and, entering Syria, pushed his conquests as far as the Red Sea; subdued part of Arabia, made Judæa a Roman province, and returned to Italy with all the pomp of an eastern conqueror. The Romans dreaded his approach, knowing his power, lest the bloody proscriptions of Marius and Sylla should be renewed. But he soon dispelled their fears, disbanded his army, and entered Rome as a private citizen. This modest behaviour increased his popularity immensely, and he was decreed another triumph: on which occasion he added 20,000 talents to the public treasury, and 55,000,000 of drachmæ to the national revenue. He soon after formed the first triumvirate, by uniting his interest with that of Cæsar and Crassus; which he strengthened still farther by marrying Julia, Cæsar's daughter. But this powerful confederacy, which divided the then known world amongst them, was soon broken: Julia died, Crassus was killed, and a civil broke out between Pompey and Cæsar, wherein the latter was victorious. See PHARSALIA and ROME.

Pompey fled to Egypt, intending to take refuge with Ptolemy Auletes, whom he had placed on the throne. He landed at the harbour of Pelusium; and, on quitting his wife Cornelia and his son, repeated the two verses of Sophocles: 'The free man who seeks an asylum at the court of a king will meet with slavery and chains.' He there found death. Scarcely had he landed on the shore, when Theodore, the rhetorician of the isle of Chio, Septimius the courtier, and Achillas the eunuch, who commanded his troops, wishing for a victim to present to his conqueror, stabbed him with their swords. At the sight of the assassins, Pompey covered his face with his mantle, and died like a Roman. They cut off his head, and embalmed it, to offer it to Cæsar, leaving his body naked on the shore. Philip, his freed man, collecting together, under favor of the night, the wreck of a boat, and stripping off his own cloak to cover the sad remains of his master, burnt them according to the custom. An old soldier, who had served under Pompey's colors, came to mingle his tears with those of Philip, and to assist him in performing the last offices to the manes of his general.

POMPEY (Cneius and Sextus), sons of Pompey the Great, commanded a powerful army, when they lost their illustrious father. Julius Cæsar pursued them into Spain, and defeated them at the battle of Munda, in which Cneius was slain, 45 B.C. Sextus made himself master of Sicily; but being defeated by Augustus and Lepidus, he fled to Asia with only seven ships, the remains of his fleet, which consisted of more than 350; and thence, unable to continue the war, he was obliged to retire to Lesbos, where renewing the war by raising an army, and seizing on some considerable cities, Marcus Titius, in the interest of Marc Antony, gave him battle, defeated him, took him prisoner, and basely put him to death, anno 35 B.C. See ROME.

POMPEY'S PILLAR. See ALEXANDRIA.

POM'PHOLYX, *n. s.*

Pompholyx is a white, light, and very friable substance, found in crusts adhering to the domes of the furnaces, and to the covers of the large crucibles, in which brass is made either from a mixture of copper and lapis calaminaris, or of copper and zinc.

Hill.

POMPIGNAN (J. J. Le Franc), marquis of, a French poet, born at Montauban, in 1709. His tragedy of Dido is much admired, and his translation of Virgil's Georgics is an elegant performance.

POMPILIUS (Numa), See NUMA.

POMPILUS, in ichthyology, a species of coryphœna.

POMPION. See CUCURBITA.

POMPONATIUS (Peter), an eminent Italian philosopher, born at Mantua in 1462. He was of so small a stature that he was little better than a dwarf; yet he possessed an exalted genius, and was considered as one of the greatest philosophers of his age. He taught philosophy, first at Padua, and afterwards at Bologna, with

the highest reputation. His book de Immortalitate Animæ, published in 1516, made a great noise. He maintained that the immortality of the soul could not be proved by philosophical reasons; but solemnly declared his belief of it as an article of faith. This did not, however, prevent his adversaries from treating him as an atheist; and the monks procured his book, although he wrote several apologies for it, to be burnt at Venice. His sentiments upon incantations were also thought very dangerous. He shows in his book on this subject that he believed nothing of magic and sorcery; but lays a prodigious stress on occult virtues in certain men, by which they produced miraculous effects. Paul Jovius says that he died in 1525, aged sixty-three. He was three times married; and had but one daughter, to whom he left a large sum of money. He used to apply himself to the solution of difficulties so very intensely that he frequently forgot to eat, drink, or sleep.

POMPONIUS ATTICUS. See ATTICUS.

POMPONIUS LÆTUS (Julius), an eminent Italian writer of the fifteenth century. He wrote an abridgment of the Lives of the Cæsars, and several other works.

POMPOSO, in music, in a distinguished, energetic, and full-toned manner of execution. Pompous style, figures of noisy sounds, signifying nothing. Galimatias pompeux.

POMUM, an apple; a species of seed-vessel, composed of a succulent fleshy pulp; in the middle of which is generally found a membranous capsule, with a number of cells, or cavities, for containing the seeds. Seed vessels of this kind have no external opening or valve. At the end opposite to the foot-stalk is frequently a small cavity, called by the gardeners the eye of the fruit, and by botanists umbilicus, the navel, from its resemblance to the navel in animals. Gourd, cucumber, melon, pomegranate, pear, and apple, furnish instances of the fruit or seed-vessel in question.

POND, or
PON'DER, *v. a.* & *v. n.*
PON'DERAL, *adj.*
PON'DERABLE,
PONDERA'TION, *n. s.*
PONDEROS'ITY,
PON'DEROUS, *adj.*
PON'DEROUSNESS, *n. s.*

Lat. *pondero*, *pondus*. Literally to weigh; weigh mentally; consider: think; muse; taking *on*: ponderal is, estimated by weight: ponderable is, capable of being weighed: ponderation is the art of weighing: ponderosity and ponderousness mean weight; gravity: ponderous, heavy; weighty; momentous; impressive; important.

Mary kept all these things, and *pondered* them in her heart. *Luke* ii. 19.

O my liege lord, the god of my life,
Pleaseth you *pond* your suppliant's plaint.
Spenser.

This tempest will not give me leave to *ponder*
On things would hurt me more.
Shakspeare. King Lear.

If your more *ponderous* and settled project
May suffer alteration, I'll point you
Where ye shall have receiving shall become you.
Shakspeare.

Colours, popularities, and circumstances sway the ordinary judgment, not fully *pondering* the matter. *Bacon.*

It is more difficult to make gold, which is the most *ponderous* and materiate amongst metals of other metals less *ponderous* and materiate, than vice versâ, to make silver of lead or quicksilver; both which are more *ponderous* than silver. *Id.*

Imagination hath more force upon things living, than things inanimate; and upon light and subtile motions, than upon motions vehement or *ponderous*. *Id.*

This *ponder*, that all nations of the earth
Shall in his seed be blessed. *Milton's Paradise Lost.*

His *pond'rous* shield behind him cast. *Milton.*

The bite of an asp will kill within an hour, yet the impression is scarce visible, and the poison communicated not *ponderable*. *Browne.*

Crystal will sink in water, as carrying in its own bulk a greater *ponderosity* than the space in any water it doth occupy. *Id.*

The oil and spirit place themselves under or above one another, according as their *ponderousness* makes them swim or sink. *Boyle.*

Intent he seemed,
And *pond'ring* future things of wond'rous weight.
Dryden.

Whom *pond'ring* thus on human miseries,
When Venus saw her heav'nly sire bespoke. *Id.*

Impatient of her load,
And lab'ring underneath the *pond'rous* god,
The more she strove to shake him from her breast,
With far superior force he pressed. *Id.*

Pressed with the *pond'rous* blow,
Down sinks the ship within the abyss below. *Id.*

Gold is remarkable for its admirable ductility and *ponderosity*, wherein it excels all other bodies. *Ray.*

Upon laying a weight in one of the scales, inscribed eternity, though I threw in that of time, prosperity, affliction, wealth, and poverty, which seem very *ponderous*, they were not able to stir the opposite balance. *Addison.*

Thus did the money drachma in process of time decrease; but all the while we may suppose the *ponderal* drachma to have continued the same. *Arbuthnot.*

While we perspire we absorb the outward air, and the quantity of perspired matter, found by *ponderation*, is only the difference between that and the air imbibed. *Id.*

Because all the parts of an undistributed fluid are of equal gravity, or gradually placed according to the difference of it, any concretion that can be supposed to be naturally made in such a fluid must be all over of a similar gravity, or have the more *ponderous* parts nearer to its basis. *Bentley.*

POND, *n. s.* Sax. pinðan, to shut up. A small pool or lake of water; a basin; water not running or emitting any stream.

In the midst of all the place was a fair *pond*, whose shaking crystal was a perfect mirror to all the other beauties, so that it bare shew of two gardens. *Sidney.*

Through bogs and mires, and oft through *pond* or pool,
There swallowed up. *Milton's Paradise Lost.*

Had marine bodies been found in only one place, it might have been suspected that the sea was, what the Caspian is, a great *pond* or lake, confined to one part. *Woodward.*

His building is a town,
His *pond* an ocean, his parterre a down. *Pope.*

POND. In the Transactions of the Society of Arts, Manufactures, and Commerce, London, vol. viii. 1790, there is a short account of a machine for draining ponds, without disturbing the

mud It was communicated to the society, together with a drawing and model of the machine, by lieutenant-colonel Dansey. The model was made from the description of a machine used by a gentleman near Taunton for many years before, for supplying a cascade in his pleasure-grounds. The colonel's regiment was then lying at Windsor; and, thinking that the invention might be useful to supply the grand cascade at Virginia with water, he made the model, and presented it to king George III. who approved of it; in consequence of which, a penstock on that principle was constructed from the model of one of the ponds in the neighbourhood. The colonel thinks the machine may be useful in the hands of men of science, and applicable to silk, cotton, and other mills, where a steady and uniform velocity of water is wanted; which might be regulated at pleasure, occasioning no current to disturb the mud or fish, as the stream constantly runs from the surface. He says he has often made the experiment by the model in a tub of water. We must refer to the above volume of the Society's Transactions for a figure of the machine.

Fish-ponds are no small improvement of watery and boggy lands, many of which are fit for no other use. In making a pond, its head should be at the lowest part of the ground, that the trench of the flood-gate or sluice, having a good fall, may not be too long in emptying. The best way of making the head secure is to drive in two or three rows of stakes about six feet long, at about four feet distance from each other, the whole length of the pond head, whereof the first row should be rammed at least about four feet deep. If the bottom is false, the foundation may be laid with quick-lime; which, slaking, will make it as hard as a stone. Some lay a layer of lime, and another of earth dug out of the pond, among the piles and stakes; and, when these are well covered, drive in others as they see occasion, ramming in the earth as before, till the pond-head be of the height designed. The dam should be made sloping on each side, leaving a waste to carry off the over-abundance of water in times of floods or rains; and, as to the depth of the pond, the deepest part need not exceed six feet, rising gradually in shoals towards the sides, for the fish to sun themselves, and lay their spawn. Gravelly and sandy bottoms, especially the latter, are best for breeding; and a fat soil with a white fat water, as the washings of hills, commons, streets, sinks, &c., is best for fattening all sorts of fish. For storing a pond, carp and to be preferred for their quick growth, and great increase, as breeding five or six times a-year. A pond of an acre, if it be a feeding and not a breeding one, will every year feed 200 carp of three years old, 300 of two years old, and 400 of a year old. Carp delight in ponds that have marle or clay bottoms, with plenty of weeds and grass, whereon they feed in the hot months. Ponds should be drained every three or four years, and the fish sorted. In breeding ones, the smaller ones are to be taken out, to store other ponds with; leaving a good stock of females, at least eight or nine years old, as they never breed before that age. In feeding ponds, it is best to keep them pretty nearly of a size.

PONDICHERRY, or PUDUCHERI, a city on the sea coast of the Carnatic, once capital of the French possessions, and the most splendid European settlement in India. It stands on a sandy plain not far from the sea-shore, producing only palm-trees, millet, and few herbs; but during the south-west monsoon, which is the season of naval warfare, it is to windward, an advantage of which the French experienced the benefit during the wars of the last century.

Pondicherry has few advantages as a commercial town, and when it ceased to be the capital of the French possessions fell into decay. In 1758 the French government, confiding in the great force sent out under M. Lally, ordered him to destroy and dismantle all the British fortifications that might fall into his power; a heavy retribution followed when Pondicherry was taken by colonel Coote, in 1761. On this occasion the fortifications were levelled, and the ditch filled up.

It has been observed that the French power in India, though of short duration, was remarkably brilliant while it lasted. It may be said to have commenced under the government of M. Dupleix in 1749, and was extinguished by the surrender of this place in 1761: the beginning of the colony has a much earlier date, and has been thus given by Dr. Hamilton. In 1601 the French first adventured to India in two ships fitted out from St. Maloes, under the command of the Sieur Bardalieur, which were wrecked next year among the Maldives Isles. In 1604 Henry IV. incorporated the first French East India Company. In 1672 the French, under M. Martin, purchased from the king of Visiapoor (Bejapoor) this village with a small tract adjacent, where he effected a settlement which soon became populous. In 1693 the Dutch took Pondicherry, which they retained until the peace of Ryswick, in 1697, when they were obliged to restore it with the fortifications greatly improved. In August 1748 admiral Boscawen besieged Pondicherry with an army of 3720 Europeans, 300 topasses, and 2000 sepoys; and, on the 6th of October, was compelled to raise the siege, having lost in the course of it 1065 Europeans. The French garrison consisted of 1800 Europeans and 3000 sepoys. M. Dupleix acted as governor during this siege, having been appointed in 1742; in 1754 he was removed from the government.

Lally landed here on the 28th of February 1758, when an active war ensued between the French and British forces, which ended in the total ruin of the former. Pondicherry surrendered to the British army under colonel Coote on the 16th of January 1761, after a long and strict blockade. The total number of European military taken in the town, including services attached to the troops, was 2072; the civil inhabits were 381; the artillery fit for service were 500 pieces of cannon, and 100 mortars and howitzers. The ammunition, arms, weapons, and military stores, were in equal abundance. At the peace of 1763 it was restored to the French East India Company, with the fortifications in a very dilapidated condition; but by great exer-

tions, and the skill of the French engineers, they were again strengthened. In October 1778 it surrendered a second time to the British under Sir Hector Monro, after a defence highly honorable to the governor M. de Bellecombe. The garrison now consisted of 3000 men, of whom 900 were Europeans; the besieging army amounted to 10,500 men, of whom 1500 were Europeans. At the peace of 1783 it again devolved to the French, but, on the breaking out of hostilities, surrendered to the British army on the 23d of August 1793. On this occasion the garrison consisted of 900 soldiers, and 1500 armed inhabitants.

At the peace of Amiens it was restored, the inhabitants being then estimated at 25,000, the revenue at 40,000 pagodas per annum, and the extent of sea coast five miles. On this event Buonaparte seems to have formed expectations of raising it to its ancient splendor, and sent out an establishment of great magnitude under general de Caen. Whatever were his plans they were all frustrated by the short duration of the peace, as Pondicherry was once more and finally occupied by the British in 1803; the French admiral Linois only escaping with his ships.

Travelling distance from Madras, 100 miles; from Seringapatam 260; from Hyderabad 452; from Delhi 1400; from Calcutta 1130; from Nagpoor 773; from Poonah 707.

PO'NENT, *adj.* Ital. *ponente.* Western.

> Thwart of these, as fierce
> Forth rushed the levant and the *ponent* winds
> Eurus and Zephyr. *Milton's Paradise Lost.*

PO'NIARD, *n. s.* Fr. *poignard;* Lat. *pugio.* A dagger; a short stabbing weapon.

> She speaks *poniards*, and every word stabs.
> *Shakspeare.*
>
> Melpomene should be represented, in her right hand a naked *poniard.* *Peacham on Drawing.*
>
> *Poniards* hand to hand
> Be banished from the field, that none shall dare
> With shortened sword to stab in closer war.
> *Dryden.*
>
> She thought to stab herself, but then she had
> The dagger close at hand, which made it awkward—
> For eastern stays are little made to pad,
> So that a *poniard* pierces if 'tis stuck hard.
> *Byron.*

PONK, *n. s.* 'Of this word I know not the original,' says Johnson; qu. PUNK, which see. A nocturnal spirit; a hag.

> Ne let the *ponk*, nor other evil sprights,
> Ne let mischievous witches. *Spenser.*

PONS-DE-TOMMIERES (St.), a post-town in the department of Herault, France, and the principal place of a subprefecture, having an inferior court of justice, an agricultural society, and a communal college, with 5600 inhabitants. It is situated in a charming valley, surrounded by mountains on the right bank of the Jaur. The church and most of the houses are built of marble, dug out of the quarries in the vicinity. The Jaur is supplied from a fine spring, which rises in the town under a lofty rock, and falls into a vast natural basin of considerable depth. On the right is a church built in the time of Charlemagne, which is in a good state of preservation; on the left, on the height, is a gothic tower, and the whole forms a most beautiful picture for the artist.

The manufactures consist chiefly in cloths for the Levant trade, and caps; there are also wool-spinning-mills, tanyard, and hydraulic saw-mills. There is a fine walk at the meeting of the roads to Castres and Salvetar. This town is seventy-six miles west of Montpelier, thirty-seven E. S. E. of Castres, and 594 south of Paris, by Alby and Cahors.

PONT A BASCULE, is a bridge which is supported by an axle-tree that runs through its centre, and is lifted up on each side as occasion requires. Pont à coulisse, a sliding or shifting bridge. This bridge is used for the purpose of conveying troops, on foot, across a fosse or a river of moderate breadth. It must be very light and portable; constructed with boards, and measuring about six feet in breadth. The planks are numbered, so that the instant it is found necessary to effect a passage, they may be put together by means of running grooves. When the planks are thus arranged, the pontoneers, to whom these matters are always entrusted, throw two thick beams across the fosse or river, so as to be parallel to each other, and about five feet asunder, to allow the floor or platform half a foot on each side. Small iron wheels or casters are fixed underneath the two sides of the floor or platform, in such a manner that the whole may be instantly slided into the deep grooves that have been previously made in the transverse beams. This construction is extremely simple, and very practicable in war. The sliding bridges may also be used to advantage in crossing rivers even of large dimensions. They are then double, and united in the middle by means of two piles, or strong stakes of wood, driven into the bed of the river, and upon which the transverse beams can rest from each side. 'It is here necessary to observe,' says major James, 'that in a war of posts, and in a broken and mountainous country, an ingenious and active officer may, at the head of a body of pontoneers, be of the greatest service to a general, and even sometimes determine the issue of a battle. When the Austrian and French armies first met, near the memorable village of Marengo, a large detachment of Buonaparte's army would have been drowned in the Scrivia, had it not been for the presence of mind and the activity of the officer who commanded a body of pontoneers. The republican troops, having been thrown into disorder, were flying in all directions; and, as the Scrivia had been considerably swollen by the rain which fell the preceding night, they would have been cut off: but ponts a coulisse, or sliding bridges, with the assistance of some boats, were hastily established, and they not only escaped the pursuit of the victorious Austrians, but added to the strength of the French army, which had also given way.' For the particulars of this transaction see Berthier's Report.

PON'TAGE, *n. s.* Lat. *pons, pontis,* a bridge. Duty paid for the reparation of bridges.

> In right of the church, they were formerly by the common law discharged from *pontage* and murage.
> *Ayliffe.*

PONT-A-MOUSSON, a post-town of the department of the Meurthe, France, the chief place of a canton in the arrondissement of Nancy, containing 7000 inhabitants. It stands at the foot of Mount Mousson, in a fine vale surrounded with fruitful hills, on the Moselle River, which divides it into two parts; that on the left bank is large, well built, and airy, and has a beautiful public square surrounded by arcades. In the neighbourhood there are two mineral springs of a chalybeate quality, which are held in some estimation. This is the native place of marshal Duroc, who died on the field of honor on the 23d of May, 1813. Here are manufactures of coarse cloth, caps, pipes, earthenware, and chamois leather; besides an important factory for the making of beet-root sugar, some dye-houses, tan-yards, &c. The trade consists in grain, wine, brandy, vegetables, wood, fir-planks, &c. This town is situated twenty-one miles N. N.W. of Nancy, and twenty-two south of Metz.

PONTARLIER, a post-town, and the chief place of an arrondissement of the same name, in the department of the Doubs, France, having a lower court of judicature and a communal college, with 4200 inhabitants. This town stands pleasantly on the river Doubs, in the midst of the Jura mountains; it is regularly built, the streets are clean and airy, and the style of the houses very elegant. Situated on the frontiers of the kingdom, at a short distance from the most convenient pass into Switzerland, it is the first mart for commerce between this republic and France. The entrance to this pass is much frequented, and defended by a castle built on an almost inaccessible rock, called the fort of Joux. The manufactures of the place consist of wooden utensils, scythes, steel goods, &c. They have also forges, flatting mills, refining and blast furnaces, and hydraulic saw-mills. Their trade is chiefly in corn, wine, brandy, grocery, butter, cheese, horses, cattle, marble, gypsum, flint, turf, &c. The fine cheese called Grayere cheese is made in the neighbouring mountains. Pontarlier is forty-five miles south-east of Besançon, thirty east of Salins, sixty north-east of Lous-le-Saulnier, and 339 south-east of Paris.

PONTANUS (John Jovian), a learned Spanish historian, born in 1426. He was preceptor and secretary to Alphonsus V. king of Arragon. He wrote the History of the Wars of Ferdinand I. and John of Anjou; and died in 1503, aged seventy-seven.

PONTANUS or DUPONT (Peter), a learned grammarian of Bruges, who flourished in the beginning of the sixteenth century; and, though he lost his sight in his thirteenth year, acquired a high degree of erudition. He taught the Belles Lettres at Paris with great reputation, and published several valuable works.

PONT-AUDENIER, a post-town, and the principal place of an arrondissement of the same name in the department of the Eure, France, having an inferior court of justice, and a chamber of commerce, with about 5500 inhabitants. It is pleasantly situated in a fertile country, at the foot of a mountain, and near some beautiful meadows, on the left bank of the Rille, which is navigable here and forms a smal. port. It is surrounded with walls and ditches filled with running water, and is generally well built; the streets are fine, and the public places very pleasant. The manufactures consist of printed linens, caps, and glue; there are cotton spinning-mills, tan-yards, producing highly esteemed leather, paper-mills, &c., and a trade is carried on in these articles, as well as cotton, velvet, flax, elder, corn, and cattle. It is fifty-one miles north-west of Evreux, thirty-six E. N. E. of Rouen, fifteen E. S. E. of Honfleur, and 121 north-west of Paris.

PONCHARTRAIN, a lake of Louisiana, United States, about thirty-five miles long from east to west, twenty-five broad, and in general from twelve to twenty feet deep. It communicates with Lake Borgne on the south-east, Lake Maurepas on the north-west, and the city of New Orleans by Bayou St. John on the south. It is surrounded by marshes, and the landing, on account of the mud, is in many places difficult.

PONT DE BATEAUX, French, is a bridge of boats. When a river is either too broad, too deep, or too rapid, to allow stone or pile-work to be used, a number of boats or barges must be moored and lashed together, at given distances, over the whole breadth of the river; and, when this has been done, a solid floor or platform is constructed on them, for the passage of cannons, waggons, &c. Pont à fleur d'eau, French, a bridge which lies upon the surface of the water. It is generally made for the purpose of keeping up a communication with the different works in a fortified place, when the ditches are filled with water. The bridge is raised upon wooden trestles.

PONT DE FASCINES, French, a bridge made of hurdles or fascines. It is generally six toises in breadth, and is used at sieges when the fosses are filled with water. When the besiegers have resolved to storm a breach, the approach to which is interrupted by water, they throw one, two, or three beds of fascines across, fastened together and kept steady by means of wooden piles. Stones and earth are next thrown upon the fascines, to keep them steady in the water. An epaulement is then made towards the side of the revêtement of the place, and the bridge is finally constructed with thick planks. The epaulement serves to protect the workmen or artificers from the fire of the besieged.

PONT DE CORDES, French, a bridge of ropes, or a bridge constructed with ropes A French writer says, 'I have not been able to discover, in any work, not even in the Dictionnaire Raisonné des Sciences, a description of this bridge; yet it is well known that by the means of this construction (which owes its origin to two Catalonian priests, and to which we are indebted for the knowledge of a passage over the Legra) the count d'Harcourt gained a victory over the Spaniards in the plain of Lorens, on the 22d of June, 1745. These bridges are made with strong ropes, twisted and interwoven together; and are extremely useful in passing deep ravines and hollows.

PONT D'OR, French, in military affairs, is a figurative expression which the French use, when they suffer an enemy whom they have de-

feated to retire without molestation. Hence, faire un pont d'or à son ennemi, to suffer your enemy to escape. Pont-tournant is a moveable bridge, of the nature of a draw-bridge, with this difference, that it turns upon a pivot, and goes entirely round. Pont de jones is a bridge made up of large trusses of rushes or willows that grow in marshy spots, or upon the banks of a river. These are bound together, and, with planks thrown upon them, serve to afford a passage over fosses, &c. Pont de sortie, a sally-bridge. Pont dormant, a wooden bridge, generally laid upon the fosse of a fortified town, for the purpose of maintaining a constant communication between the main body of the place and the outworks and country round. These bridges are not thrown entirely across the fosses, but terminate within twelve or fifteen feet of the revètement; the space thence is supplied by draw-bridges. When the pont dormant is very long a swing bridge is constructed in the centre of it. When the ditches are wet, and so constantly supplied with water that the depth is generally the same, bridges of boats may be used instead of ponts dormans. And, in cases of attack, floating bridges may be substituted in lieu of both.

PONT-DU-GARD, about sixteen miles north-east of Nimes on the road to Avignon, France, one of the finest remains of ancient architecture in the world, is situated in a narrow defile, where the Gard rolls its impetuous torrent in the midst of a silent solitude. It is a Roman aqueduct, intended to convey water from the fountain of Eurus, and composed of three rows of arcades rising one over another along an extent of 600 feet, and 160 feet high. The first row stretches over the whole breadth of the valley, and consists of six arches, under one of which flows the Gardon; the second is formed of eleven arches; the third has thirty-five arches, and supports the canal or aqueduct, which is six feet broad by as many in depth. It is constructed in the Tuscan style, with astonishing solidity and admirable lightness; the enormous masses of stone being supported merely by their own weight and exact equilibrium, without the least cement: with the exception of the upper extremities, it is in such perfect preservation that it might comparatively be accounted of recent erection.

This amazing monument of the genius of the Romans is supported by two mountains, which it unites for the purpose of continuing the passage of the waters. The sides and bottom of the aqueduct are covered with a cement extremely well preserved, even in the subterraneous parts, where it is entirely laid on the rock. It winds its course over mountains and rocks for full thirty miles, branching off into three conduits, one of which conveys the water to the amphitheatre at Nimes, the second to the fountain, and the third to the private houses. One of these channels is to be seen, almost entire, in a private enclosure. Besides these, there are some smaller ones, that convey the water to several country-houses in the neighbourhood. That part which is in the best state of preservation is between the Pont-du-Gard and Nimes, and which, from its running under ground, has suffered less dilapidation than others. You may go from one end to the other of the Pont-du-Gard, climbing up the declivity on the right bank of the Gardon, to reach the southern extremity of the aqueduct, at the place where it loses itself in the mountains. A modern bridge, forming the passage of the great road, abuts on the aqueduct, which it supports and by which it is supported in its turn.

PONTE-CORVO, a town of the papal state, the capital of a small delegation, situated on the Garigliano. It is the see of a bishop, united to that of Aquino; and has a castle, cathedral, six churches, and 5200 inhabitants. Bernadotte, now king of Sweden, formerly bore the title of its prince.

PONTEDERIA, in botany, a genus of the monogynia order, belonging to the hexandria class of plants; and in the natural method ranking under the sixth order, ensatæ. The corolla is monopetalous, sexfid, bilabiate; there are three stamina inserted into the top, and three into the tube of the corolla; the capsule is bilocular.

PONTEFRACT, or POMFRET, an ancient borough and market town, in the liberty of the honor and parish of this name, in the wapentake of Osgoldcross, and West Riding of Yorkshire, 173 miles from London, forty-seven from Manchester, twenty-four from York, thirteen from Leeds, and nine from Wakefield. The town stands on a fine eminence, and is approached on every side by a considerable ascent, a little below the conflux of the rivers Aire and Calder. Authors disagree greatly respecting the derivation of its name; by some it is stated to have obtained the appellation 'Pomfret' from Porho ferre, on account of its fertile soil, but Camden asserts that it was changed by the Romans to 'Pontefract.' The town is famous in history for its castle, in which king Richard II. was murdered or starved to death, and where the earls Rivers and Grey, Sir Thomas Vaughan and Sir Richard Hawse, were, by the machinations of the duke of Gloucester, afterwards Richard III., basely murdered. This celebrated castle was built about the year 1078 or 1080; and situated on an elevated rock, commanding extensive views of the surrounding scenery, and affording to the town, from its strength, every protection during the time of the civil wars. It occupied a space of more than six acres, and was considered the largest in England; few remains of it are now to be seen.

Pontefract was a burgh in the time of Edward the Confessor, from which period it has sent two members to parliament. The franchise is in the inhabitant householders. The government of the town is in a body corporate, consisting of a mayor, recorder, and twelve aldermen (all of whom are in the commission of the peace), with a common council consisting of twenty-four burgesses. The quarter-sessions for the borough are held in the court-house of the town-hall, a handsome modern building, erected at the joint expense of the corporation and the riding; in this building is the savings' bank, and also the rotation office, where the magistrates hold their weekly sittings for the despatch of the magisterial business of the borough. At the top of the beast-market is a stately court-house, erected a

few years since by the riding; in this building the sessions of the peace, for the west riding, are held annually in Easter week. The parish church, dedicated to St. Giles, is of high antiquity, being known as early as the reign of Henry I. in the charter of Hugh Delaval; it is small, and with few exterior beauties; but the interior yields to none in neatness: the living is a vicarage in the patronage of the king. Besides the parish church, the other places of worship are a chapel each belonging to the Methodists, Calvinists, Roman Catholics, and Friends. There are various charity hospitals, and the king's free grammar school, founded and endowed by Edward VI., and a charity school founded by the earl of Strafford in 1695. The places of amusement are the assembly room, a neat theatre, and an excellent race-ground, about a mile from the town, where races take place annually, and which are respectably and numerously attended.

Pontefract never has been noted as a manufacturing town, but it possesses an excellent local trade, which is much advanced by the highly respectable neighbourhood, studded with many fine seats of the nobles, and opulent individuals. The vicinage of the town is also famed for its gardens and nurseries, which are very extensive, and great quantities of vegetables, &c., are carried hence for the supply of the Leeds, Wakefield, and other markets. Liquorice is also grown about here to a considerable extent. The well supplied market is on Saturday. The market-cross, called St. Oswald's Cross, was pulled down in 1735, and a handsome dome erected in its place, supported by a colonnade of Doric pillars. Fairs, on the Saturday before Palm-Sunday, and the Saturday after St. Andrew's Day, both for cattle. Here are also small fairs for cattle every fortnight, on the Saturday after those at York.

PONTICELLO, in music, an Italian expression for the bridge of a violoncello, violin, &c.

PONTIFEX. Lat. From *pons*, a bridge, and *facio*, to make; q. d. a bridge-builder. A priest, or chief priest, as well as an overseer of bridges, the latter office being entrusted to the chief priests among the ancient Romans. See PONTIFF.

PON'TIFF, *n. s.*
PONTIF'ICAL, *adj.* & *n. s.*
PONTIF'ICATE, *n. s.*
PONTIFI'CIAN.
} Fr. *pontife*; Lat. *pontifex*. A priest; a high priest; the pope: pontifical is, belonging to a pontiff; splendid; magnificent; a book of ecclesiastical ceremonies: pontificate, the state or quality of a pontiff; the popedom: pontifician, a papist.

Thus did I keep my person fresh and new,
My presence, like a robe *pontifical*,
Ne'er seen, but wondered at.
Shakspeare. Henry IV.

It were not amiss to answer by a herald the next *pontifical* attempt, rather sending defiance than publishing answers. *Raleigh.*

Livy relates, that there were found two coffins, whereof the one contained the body of Numa, and the other his books of ceremonies, and the discipline of the *pontiffs*. *Bacon.*

Many other doctors, both *pontificians* and of the reformed church, maintain that God sanctified the seventh day. *White.*

By the *pontifical*, no altar is to be consecrated without reliques. *Stillingfleet.*

What the Greek and Latin churches did, may be seen in *pontificals*, containing the forms for consecrations. *South.*

He turned hermit in the view of being advanced to the *pontificate*. *Addison.*

Painting, sculpture, and architecture may all recover themselves under the present *pontificate*, if the wars of Italy will give them leave. *Id.*

The *pontifical* authority is as much superior to the regal as the sun is greater than the moon. *Baker.*

PONTIFF, or high-priest, Lat. *pontifex*, a person who has the superintendance and direction of divine worship, as the offering of sacrifices and other religious solemnities. The Romans had a college of pontiffs; and over these a sovereign pontiff, or pontifex maximus, instituted by Numa, whose function was to prescribe the ceremonies each god was to be worshipped withal, compose the rituals, direct the vestals, and for a good while to perform the business of augury, till, on some superstitious occasion, he was prohibited intermeddling therewith. The office of the college of pontiffs was to assist the high-priest in giving judgment in all causes relating to religion, enquiring into the lives and manners of the inferior priests, and punishing them if they saw occasion, &c. The Jews too had their pontiffs; and, among the Romanists, the pope is still styled the sovereign pontiff.

PONTIF'ICAL, *adj.*
PON'TIFICE, *n. s.*
} Lat. *pons* and *facio*. Relating to bridge-building: bridge work.

Now had they brought the work by wondrous art
Pontifical, a ridge of pendant rock
O'er the vexed abyss. *Milton's Paradise Lost.*
He, at the brink of Chaos, near the foot
Of this new wondrous *pontifice*, unhoped
Met his offspring dear. *Id.*

PONTIFICATE is used for the state or dignity of a pontiff or high-priest; but more particularly, in modern writers, for the reign of a pope.

PONTINA LACUS, PONTINE LAKE, or PONTINE MARSHES, a lake or marshes of Italy, in the country of the Volsci, through which the great Appian road passed. Travellers were conveyed in boats, drawn by mules, along the canal that ran from Appii Forum to Terracina. From its stagnant waters the air had become so noxious that travellers had long avoided passing near it, till pope Pius VI., at great expense, drained the lake and the marshes, and made a most excellent road here. It is still, however, very unhealthy, and all travellers are advised to pass it, if possible, without sleeping, or stopping longer than is necessary to bait or change horses. See PIUS VI.

PONTINUS, in ancient geography, a mountain and river of Argolis. Hor. Sat. v. 9. Lucan iii. 85.

PON'TON, *n. s.* Fr. *ponton*. A floating-bridge.

The black prince passed many a river without the help of *pontons*. *Spectator.*

Ponton is a floating bridge or invention to pass over water: it is made of two great boats placed at some distance from one another, both planked over, as is the interval between them, with rails on their sides; the whole so strongly built as to carry over horse and cannon. *Military Dictionary.*

PONTON, or PONTOON, a kind of flat-bottomed boat, whose carcass of wood is lined, within and without, with tin, serving to lay bridges over rivers for the artillery and army to march across. The French pontoons, and those of most other powers, are made of copper on the outside: though they cost more at first, yet they last much longer than those of tin; and, when worn out, the copper sells nearly for as much as it cost at first; but, when ours are rendered useless, they sell for nothing. Our pontoons are twenty-one feet six inches long at top, and seventeen feet two inches at bottom, four feet nine inches broad, and depth within two feet three inches. The common pontoons will support a weight of 4000 or 5000 pounds. General Congreve's wooden pontoons are twenty-six feet long at top, twenty-three at bottom, two feet eight inches deep, and two feet three inches wide.

The PONTOON-CARRIAGE is made with two wheels only, and two long side-pieces, whose fore-ends are supported by a limber. It serves to carry the pontoon-boards, cross timbers, anchors, and every other thing necessary for making a bridge.

A PONTOON-BRIDGE is made of pontoons, slipped into the water, and placed about five or six feet asunder; each fastened with an anchor, when the river has a strong current, or to a strong rope that goes across the river, running through the rings of the pontoons. Each boat has an anchor, cable, baulks, and chests. The baulks are about five or six inches square, and twenty-two feet eight inches long. The chests are boards joined together by wooden bars, about three feet broad, and twelve feet long. The baulks are laid across the pontoons at some distance from one another, and the chests upon them joined close. One gang board twenty-two feet long, one foot wide, and two inches and a half thick.

PONTOPPIDAN (Erick), a Danish divine, born in the isle of Fulinen, in 1616. He was made bishop of Drontheim in Norway, and published several learned works, particularly a Grammar of the Danish Language. He died in 1678, aged sixty-two.

PONTOPPIDAN (Erick), a Danish historian, grand-nephew of the preceding, who became bishop of Bergen in Norway. He wrote, 1. A History of Norway; 2. A History of the Reformation in Denmark; and several other works.

PONT-ST.-ESPRIT, a small post-town of the department of the Gard, France, the chief place of a canton in the arrondissement of Uzès, containing rather more than 5000 inhabitants, stands on the right bank of the Rhone, and has a very convenient port. In general it is badly built, consisting of a few narrow and dirty streets. It is defended by an ancient citadel built by Louis XIII., to restrain the protestants. The town is remarkable chiefly for a bridge built over the Rhone of amazing boldness, length, and solidity; it is composed of twenty-six arches, nineteen of which are large and seven small; its length is 420 feet, and its breadth seventeen. It describes in its course several windings, owing to the difficulty that was found in laying the foundations. Commenced in 1265, under the reign of St. Louis, it was finished in 1309 under that of Philip the Fair. The Rhone is in this place extremely rapid, and the currents, which set in front of the arches, draw the boats through with the swiftness of a dart. There is a trade carried on here in wines, oils, fruit, silk, &c., and considerable markets are held on Tuesday and Saturday in every week. It is forty miles north-east of Uzès, and twenty-one north-west of Orange.

PONTUS, an ancient kingdom of Asia, originally a part of Cappadocia; bounded on the east by Colchis, on the west by the river Halys, on the north by the Euxine Sea, and on the south by Armenia Minor. Some derive the name of Pontus from the neighbouring sea, the Pontus Euxinus; others from a king named Pontus, who imparted his name both to the country and the sea: but Bochart deduces it from the Phœnician word botno, signifying a filberd, as if that nut abounded remarkably in this place. But this derivation seems to be very far fetched; and the common opinion, that the country derived its name from the sea, seems by far the most probable. The kingdom was divided into three parts, viz. 1. Pontus Cappadocius extending from Pontus Polemoniacus to Colchis, having Armenia Minor and the upper stream of the Euphrates for its southern boundary. 2. Pontus Galaticus, extending from the river Halys to the Thermodon. 3. Pontus Polemoniacus, from the Thermodon to the borders of Pontus Cappadocius.

This country and the adjacent provinces were, in different periods, under the dominion of the Assyrians, Medes, and Persians; the last of whom divided Cappadocia into satrapies or governments. This regulation was effected in the reign of Darius the son of Hystaspes, and has been regarded as the date of the kingdom. The first king of this country whom we find mentioned in history is Artabazus, who had the crown bestowed on him by Darius Hystaspis. The next was Rhodobates, who reigned in the time of Darius Nothus. After him came Mithridates, who, refusing to pay the usual tribute to the Persians, was defeated by Artaxerxes Mnemon; but a peace was soon after concluded by the mediation of Tissaphernes. Besides this, we hear nothing of him, farther than that he was treacherously taken prisoner by Clearchus, afterwards tyrant of Heraclea, and obliged to pay a large sum for his ransom. Mithridates I. was succeeded by Ariobarzanes, who being appointed by Artaxerxes governor of Lydia, Ionia, and Phrygia, employed the forces that were under his care in the extending of his own dominions, and subduing those of his natural prince. The king of Persia sent Autophrodates against him; but Ariobarzanes, having with great promises prevailed on Agesilaus and Timothæus the Athenian to come to his assistance, obliged Autophrodates to retire. He then rewarded Agesilaus with a great sum of money, and bestowed on Timothæus the cities of Sestos and Abydos, which he had lately taken from the Persians. He used his utmost endeavours to reconcile the Lacedemonians and Thebans; but, not being able to bring the latter to any reasonable terms, he assisted the

Lacedemonians with vast sums of money. The Athenians showed so much respect for this prince, that they not only made him free of their city, but granted both him and his children whatever they asked of them. He was murdered in the 28th year of his reign by one Mithridates, about the time that Alexander the Great invaded Asia; so that Pontus for a time fell under the power of the Macedonians.

In the reign of Antigonus, Mithridates the son of Ariobarzanes shook off the Macedonian yoke. Under those of Mithridates III., Ariobarzanes II., and Mithridates IV., the immediate successors of Mithridates II., nothing remarkable happened. But Mithridates V. made war on the inhabitants of Sinope, a city on the coast of Paphlagonia, and became master of all the adjacent places; but finding the peninsula on which Sinope stood well fortified and garrisoned by the inhabitants, and their allies the Rhodians, he abandoned the enterprise. He afterwards proved a great friend to the Rhodians. He entered also into a strict alliance with Antiochus the Great, who married one of his daughters.

After the death of Mithridates V. his son Pharnaces I. invaded the territories of Eumenes, the great ally of the Romans, when the latter sent ambassadors to Rome, and entered into an alliance with Ariarathes king of Cappadocia. Pharnaces, in his turn, also sent ambassadors to Rome, complaining of Eumenes and Ariarathes; upon which some Romans were sent into Asia to arbitrate between them and Pharnaces; but the latter, being disappointed of assistance from Seleucus king of Syria, whom the Romans would not allow to join him, was at last forced to sue for peace. Mithridates, king of Armenia, who had joined Pharnaces, was obliged to pay 300 talents to Ariarathes for having assisted his enemy, contrary to a treaty then subsisting between them. Soon after Pharnaces died, and left the kingdom to his son Mithridates VI., more weakened by this peace than by the most destructive war. The new king entered into an alliance with the Romans, and proved such a faithful friend that he was rewarded by the senate with Phrygia Minor, and honored with the title of the friend and ally of the people of Rome. After a long and prosperous reign he was murdered by some of his intimate acquaintance, and was succeeded by his son Mithridates VII., surnamed the Great.

In his youth this young prince took care to inure himself to hardships, passing whole months in the open air, employed in the exercise of hunting, and often taking his rest amidst the frozen snow. He married his sister Laodice, by whom he had a son named Pharnaces. After this he took a journey through many different kingdoms of Asia, and learned their different languages, of which he is said to have spoken twenty-two. During the three years which he spent in this country, a report being spread that he was dead, his wife Laodice had a son by one of her courtiers. When her husband returned, she presented him with a poisoned bowl; but Mithridates had accustomed himself to take poison, so that it only hastened the destruction of his wife, and all those who had been accessory to her incontinence. The king now began to put in execution his schemes of conquest. He began with Paphlagonia, which the Romans had declared a free state. This he easily reduced, and divided between himself and his ally, Nicomedes king of Bithynia. The Romans remonstrated; but Mithridates, disregarding them, invaded and reduced Galatia, and then turned his eyes on Cappadocia. That kingdom was then held by Ariarathes, a favorite of the Romans, who had married a sister of Mithridates; still he did not scruple to hire an assassin to despatch him while his kingdom was invaded by Nicomedes of Bithynia. The particulars of the tragedy that followed the succession and death of his uncle, the villanous attempts of Mithridates to get his own son made king of Cappadocia, with the equally villanous measures taken by queen Laodice and Nicomedes of Bithynia to disappoint him, with the appeal of all parties to the Romans, and their decision, are related under CAPPADOCIA, which see. The election of Ariobarzanes by the Cappadocians now followed his expulsion by Tigranes, and restoration by Sylla: and these transactions completely involved Mithridates with the Romans.

The *Mithridaticum Bellum* of the Roman historians was the sequel; one of the longest and most celebrated wars ever carried on by the Romans against a foreign power. The ambition of Mithridates, from whom it receives its name, may be called the cause and origin of it. Three Roman officers, L. Cassius, the proconsul, M. Aquilius, and Q. Oppius, at first opposed Mithridates with the troops of Bithynia, Cappadocia, Paphlagonia, and Gallo-Græcia. The army of these provinces, together with the Roman soldiers in Asia, amounted to 70,000 men, and 6000 horse. The forces of the king of Pontus were greatly superior; he led 250,000 foot, 40,000 horse, and 130 armed chariots, into the field of battle, under the command of Neoptolemus and Archelaus. His fleet consisted of 400 ships of war, well manned and provisioned. In an engagement the king of Pontus obtained the victory, and dispersed the Roman forces in Asia. He became master of the greatest part of Asia, and the Hellespont submitted to his power. Two of the Roman generals were taken, and M. Aquilius, who was principally entrusted with the conduct of the war, was carried about in Asia, and exposed to the ridicule and insults of the populace, and at last put to death by Mithridates, who ordered melted gold to be poured down his throat, as a slur upon the avidity of the Romans. The conqueror took every possible advantage; he subdued all the islands of the Ægean Sea, and, though Rhodes refused to submit to his power, yet all Greece was soon over-run by his general Archelaus, and made tributary to the kingdom of Pontus. Meanwhile the Romans incensed against Mithridates on account of his perfidy, and of his cruelty in massacring 80,000 of their countrymen in one day all over Asia, appointed Sylla to march into the east. Sylla landed in Greece, where the inhabitants readily acknowledged his power; but Athens shut her gates against the Roman commander, and Archelaus, who defended it, defeated, with the

greatest courage, all the efforts and operations of the enemy. This spirited defence was of short duration. Archelaus retreated into Bœotia, where Sylla soon followed him. The two hostile armies drew up in a line of battle near Chæronea, and the Romans obtained the victory, and, of the almost innumerable forces of the Asiatics, no more than 10,000 escaped.

Another battle in Thessaly, near Orchomenos proved equally fatal to the king of Pontus. Dorylaus, one of his generals, was defeated and he soon after sued for peace. Sylla listened to the terms of accommodation, as his presence at Rome was now become necessary to quell the commotions and cabals which his enemies had raised against him. He pledged himself to the king of Pontus to confirm him in the possession of his dominions, and to procure him the title of friend and ally of Rome; and Mithridates consented to relinquish Asia and Paphlagonia, to deliver Cappadocia to Ariobarzanes, and Bithynia to Nicomedes, and to pay to the Romans 2000 talents to defray the expenses of the war, and to deliver into their hands seventy galleys with all their rigging. Though Mithridates seemed to have re-established peace in his dominions, yet Fimbria, whose sentiments were contrary to those of Sylla, and who made himself master of the army of Asia by intrigue and oppression, kept him under continual alarms, and rendered the existence of his power precarious. Sylla, who had returned from Greece to ratify the treaty which had been made with Mithridates, rid the world of the tyrannical Fimbria; and the king of Pontus, awed by the resolution and determined firmness of his adversary, agreed to the conditions, though with reluctance. The hostile preparations of Mithridates, which continued in the time of peace, became suspected by the Romans, and Muræna, who was left as governor of Asia in Sylla's absence, and who wished to make himself known by some conspicuous action, began hostilities by taking Comana and plundering the temple of Bellona. Mithridates did not oppose him, but he complained of this breach of peace before the Roman senate. Muræna was publicly reprimanded; but, as he did not cease from hostilities, it was easily understood that he acted by the private directions of the Roman people. The king upon this marched against him, and a battle was fought, in which both the adversaries claimed the victory. This was the last blow which the king of Pontus received in this war, which is called the second Mithridatic war, and which continued for about three years. Sylla, at that time, was made perpetual dictator at Rome, and he commanded Muræna to retire from the kingdom of Mithridates. The death of Sylla changed the face of affairs; the treaty of peace between the king of Pontus and the Romans, which had never been committed to writing, demanded frequent explanations, and Mithridates at last threw off the mask of friendship, and declared war. Nicomedes, at his death, left his kingdom to the Romans, but Mithridates disputed their right to the possessions of the deceased monarch, and entered the field with 120,000 men, besides a fleet of 400 ships in his ports, 16,000 horsemen to follow him, and 100 chariots armed with scythes. Lucullus was appointed over Asia, and entrusted with the care of the Mithridatic war. His valor and prudence showed his merit; and Mithridates, in his vain attempts to take Cyzicum, lost no less than 300,000 men. Success continually attended the Roman arms. The king of Pontus was defeated in several bloody engagements, and with difficulty saved his life, and retired to his son-in-law Tigranes, king of Armenia. Lucullus pursued him, and, when his applications for the person of the fugitive monarch had been despised by Tigranes, he marched to the capital of Armenia, and terrified, by his sudden approach, the numerous forces of the enemy. A battle ensued. The Romans obtained an easy victory, and no less than 100,000 foot of the Armenians perished, and only five men of the Romans were killed. Tigranocerta, the rich capital of the country, fell into the conqueror's hands. After such signal victories, Lucullus had the mortification to see his own troops mutiny, and to be dispossessed of the command by the arrival of Pompey. The new general showed himself worthy to succeed Lucullus. He defeated Mithridates, and rendered his affairs so desperate that the monarch fled for safety into the country of the Scythians, where, for a while, he meditated the ruin of the Roman empire, and, with more wildness than prudence, secretly resolved to invade Italy by land, and march an army across the northern wilds of Asia and Europe to the Appennines. Not only the kingdom of Mithridates had fallen into the enemy's hands, but also all the neighbouring kings and princes were subdued, and Pompey saw prostrate at his feet Tigranes himself, that king of kings, who had lately treated the Romans with such contempt. Meantime, the wild projects of Mithridates terrified his subjects; and they, fearful to accompany him in a march of above 2000 miles across a barren and uncultivated country, revolted and made his son king.

The monarch, forsaken in his old age, even by his own children, put an end to his life (see Mithridates VII.), and gave the Romans cause to rejoice, as the third Mithridatic war was ended in his fall, B.C. 63. Such were the unsuccessful struggles of Mithridates against the power of Rome. He was always full of resources, and the Romans had never a greater or more dangerous war to sustain. The duration of the Mithridatic war is not precisely known. According to Justin, Orosius, Florus, and Europius, it lasted for forty years; but the opinion of others who fix its duration to thirty years, is far more credible; and, indeed, by proper calculation, there elapsed no more than twenty-six years from the time that Mithridates first entered the field against the Romans, till the time of his death.

Pompey, who was then engaged in a war with the Jews, received the first notice of the death of Mithridates as he was on his march to Jerusalem, and was so impatient to impart it to the soldiery that he could not even wait till they had raised him a mount of turf from whence to speak to the army, according to the custom of the camp; but ordered those who were by him to form a kind of mount with their saddles, and

from thence acquainted the soldiery that Mithridates had laid violent hands on himself, and his son Pharnaces was ready to acknowledge the kingdom as a gift of the people of Rome. This news was received with joyful shouts by the army, and the day solemnised with feasts and sacrifices throughout the camp. For the general joy at Rome on that occasion, see MITHRIDATES VII. Pharnaces, when he heard of his father's death, caused his body to be preserved in brine, proposing to present it to Pompey, who had promised to return into Pontus after the reduction of Judea. Accordingly, having taken the city and temple of Jerusalem, he set out with two legions for Pontus; and, being arrived at Sinope, was there met by ambassadors from Pharnaces, acquainting him that their master had forbore assuming the title of king till his will and pleasure were known. The same ambassadors delivered up to Pompey those who had taken M. Aquilius, all the prisoners, hostages, and deserters, whether Romans, Greeks, or Barbarians, and the body of Mithridates, with his rich apparel and arms. Both soldiers and officers flocked to see the king's body; but Pompey declined the sight; saying that all enmity between that great prince and the people of Rome was ended with his life. He returned the body to the ambassadors, and caused it to be interred, with the utmost pomp and magnificence, in the burying place of the kings of Pontus.

Pompey now bestowed the kingdom of Bosphorus on Pharnaces, and honored him with the title of a friend and ally of the people of Rome; and the latter sent orders to all the garrisons of Pontus to submit themselves, with the castles and treasures with which they were entrusted, to Pompey, who by that means amassed an immense booty. In the city of Talaura alone, which Mithridates used to call his wardrobe, he found 2000 cups of onyx set in gold, with such quantities of gold and silver vessels, costly furniture, saddles, bridles, and trappings, set with jewels and precious stones, that the Roman commissaries spent thirty days in taking the inventory. In another castle he found three large tables with nine salvers of massy gold, enriched with precious stones of great value; the statues of Minerva, Mars, and Apollo, of pure gold and most curious workmanship; and a pair of gaming tables of two precious stones, three feet broad, and four feet long, on which was a moon of gold weighing thirty pounds, with their men. In a fort situated among the mountains were delivered up to him the king's statue of massy gold, eight cubits high, his throne and sceptre, and the bed of Darius Hystaspis. Most of these treasures had been transmitted to him from his ancestors, chiefly from Darius king of Persia; some belonged to the Ptolemies of Egypt, and had been deposited by Cleopatra in the hands of the Coans, who delivered them to Mithridates. Pompey having thus obtained entire possession of Pontus, and reduced it to the form of a Roman province, marched into Asia properly so called; and, having wintered at Ephesus, early in spring set out for Italy with a fleet of 700 ships. As he brought over his army, the senate was under no small apprehension lest he should make himself absolute; but he no sooner landed at Brundusium, than he disbanded the army, see the article POMPEY, without waiting for any decree of the senate. He was attended in his triumphal chariot by 324 captives of distinction, among whom were five sons and two daughters of Mithridates.

Pompey had no sooner left Asia, but Pharnaces fell unexpectedly upon the Phanagorenses, a people of Bosphorus, whom Pompey had declared free, because they had revolted the first of all from Mithridates, and by their example induced others to abandon the king's party. Pharnaces besieged their chief city Phanagoria, and kept them blocked up till, for want of provisions, they were forced to sally out, and put all to the issue of a battle; which proving unsuccessful, they delivered up themselves and their city to the conqueror. Some years after, the civil war breaking out between Cæsar and Pompey, he laid hold of that opportunity to recover the provinces which his father had formerly possessed; and, having raised a considerable army, over-ran Pontus, Colchis, Bithynia, Armenia, and the kingdom of Moschis, where he plundered, as Strabo observes, the temple of the goddess Leucothea. He took the strong and important city of Sinope, but could not reduce Amisus. But Cæsar, having got the better of Pompey and his party, appointed Cn. Domitius Calvinus governor of Asia, enjoining him to make war upon Pharnaces with the legions that were quartered in that province. Domitius immediately sent ambassadors to Pharnaces, commanding him to withdraw his troops from Armenia and Cappadocia. The king answered that he was willing to abandon Cappadocia, but Armenia Minor was part of his hereditary dominions, and therefore he would not resign it till he had laid his pretensions before Cæsar himself, whom he was ready to obey. Hereupon Domitius, drawing together what forces he could, marched into Cappadocia, which he recovered without opposition, Pharnaces having abandoned it to make a stand in Armenia, which lay nearer his own dominions. Thither Domitius pursued him; and, having overtaken him near Nicopolis, Pharnaces, at the head of a choice body of men, fell upon the Roman left wing, consisting mostly of raw and undisciplined Asiatics; and, having put them to flight, penetrated to the centre, where the thirty-fifth legion, the only one which Domitius had, after a faint resistance, gave ground, and, retiring to the neighbouring mountains, left their allies to shift for themselves, who were all cut off. Domitius, with the remains of his army, marched back into Cappodocia; and thence into the province of Asia. The king being elated with this victory, and hearing that Cæsar, with the flower of the Roman forces, was engaged at the siege of Alexandria, appointed one Asander governor of Bosphorus, and marched himself into Cappadocia in pursuit of Domitius with a design to invade Asia, and recover all the provinces which had been subdued by his father.

Bithynia and Cappadocia readily submitted; but Armenia Minor, which was held by Dejotarus, made so vigorous a resistance, that he was forced to give over the enterprise, lest the Ro-

mans should in the mean time strengthen themselves in Asia, whither he was in haste to march, in hopes of meeting there with the same success as his father had done. But, before he reached that province, he was informed that Asander had revolted, and obtained of the Romans the kingdom of Bosphorus for himself. At the same time, he received intelligence that Cæsar, having at last reduced Alexandria, and settled the affairs of Egypt and Syria, was marching into Armenia. Alarmed at this news, he despatched ambassadors to sue for peace. Cæsar courteously entertained the ambassadors, and appeared very desirous of entering into a treaty. But, in the mean time, he pursued his march; and, arriving on the confines of Pontus, ordered all the troops that were quartered in the neighbouring province to join him; for he had brought from Alexandria only the sixth legion, consisting of 1000 men only. With these forces he advanced against Pharnaces; who being greatly frightened at his approach, from his success in all his expeditions, again despatched ambassadors, with a crown of gold, offering his daughter in marriage, and promising to do whatever he should require. The ambassadors took care to let him know that their master, though highly obliged to Pompey, yet had never been prevailed upon to send him any supplies during the civil war, which Dejotarus, king of Armenia Minor, whom he had honored with his friendship, had done. Cæsar answered that he was willing to conclude a peace with Pharnaces, provided he retired from Pontus, returned all the captives and hostages, whether Roman or their allies, and restored the goods of the Roman citizens. He added that, as to his not sending supplies to Pompey, they ought rather to have concealed such an ungrateful proceeding of their master, than alleged it as any merit. Pharnaces, upon the return of his ambassadors, acquainted Cæsar that he agreed to the conditions; but, finding that Cæsar's affairs called him into Italy, he required a longer time for the performance of what was stipulated, starting daily new difficulties, in hopes that Cæsar would be obliged to depart, and leave the affairs of Pontus in the same posture he had found them. Cæsar at length could no longer brook the king's deceitful behaviour; and, marching out in the night, rushed at break of day into the king's camp, exclaiming, Shall this treacherous parricide go unpunished? The king's chariots, which were armed with scythes, caused some disorder among Cæsar's horse; but. the rest of his army coming up, he put the enemy to flight, and obtained a complete victory. This battle was fought near the place where Mithridates had routed, with great slaughter, the Roman army under Triarius; and the victory was gained so rapidly that Cæsar, in a letter to his friend Anitius, at Rome, expressed it in three words, veni, vidi, vici. Pharnaces himself had the good luck to escape while the Romans were plundering the camp. Cæsar afterwards used to call Pompey a fortunate rather than a great commander, since he had gained his chief glory in the Mithridatic war, fighting with so cowardly an enemy. The monument of Mithridates' victory over Triarus, as it was consecrated to the gods, he did not think lawful to pull down, but set up another over against it to transmit to posterity his victory over Pharnaces, and after this victory, having recovered and restored to the allies of Rome all the places which Pharnaces had taken during the war, he declared Amisus a free city, and appointed Mithridates Pergamenus king of Bosphorus in the room of Pharnaces.

Domitius Calvinus was desired to pursue the war against Pharnaces, if he should appear again in the field; for the latter had retired after the battle to Sinope, with 1000 horse. Here he was quickly besieged by Domitius, to whom he surrendered the town, upon no other condition than that he should be suffered to retire into Bosphorus with the small body that attended him. This Domitius granted, but, as he had asked a safe conduct only for his horsemen, caused all the king's horses to be killed. With these, and a band of Scythians and Sarmatians, Pharnaces attempted to recover the kingdom of Bosphorus, but being met between Theodocia and Panticapeum, both which cities he had reduced, by Asander, who was still in possession of the kingdom, a sharp engagement ensued, the king's men, not being used to fight on foot, were put to flight, and Pharnaces himself who remained alone in the field was surrounded by the enemy, and cut in pieces.

Pontus was now again reduced to the form of a province, and so continued to the triumvirate of Marc Antony, who after the battle at Philippi conferred it upon Darius the son of Pharnaces. He continued faithful to the Romans; but did nothing during his reign worth mentioning; and was succeeded in the kingdom by Polemon, likewise preferred to that honor by Marc Antony. He was the son of Zeno, a famous orator of Laodicea, and after him that part of Pontus which borders on Cappadocia was named Polemoniacus. He attended Anthony in his expedition against the Parthians; and, being taken prisoner in the unsuccessful battle fought by Statianus, was sent by the king of the Medes, an ally of the Parthians, to conclude a peace with the Romans. In this embassy he acquitted himself so well that Antony added the kingdom of Armenia to his former dominions. In the war between Antony and Augustus, although he joined the former, after the battle of Actium he was received into favor by the latter; and being sent by Agrippa against Scribonius, who, upon the death of Asander, had usurped the kingdom of Bosphorus, he reduced that state and the kingdom of Colchis, which was bestowed upon him by Agrippa, who likewise honored him with the title of friend and ally of the people of Rome. He afterwards waged war with the neighbouring barbarians who refused to live in subjection to the Romans; but was overcome and put to death by the Aspungitani, a people bordering, according to Strabo, on the Palus Mœotis.

Upon his death, his son Polemon II. was by the emperor Caligula raised to the throne of Bosphorus and Pontus. But he obliged him to exchange the former for part of Cilicia; and Nero, with his consent, reduced that part of Pontus which he enjoyed to the form of a province. He fell in love with Berenice, daughter

of Aprippa king of Judea: and to marry her embraced the Jewish religion. But as she soon became tired of his riotous way of living, and returned to her father, he renounced his new religion. Polemon dying without issue, the ancient kingdom of Pontus was parcelled out into several parts, and added to the provinces of Bithynia, Galatia, and Cappadocia; only that part of it which was called Pontus Polemoniacus retaining the dignity of a distinct and separate province.

During the civil discords between Vespasian and Vitellius, one Anicetus, first a slave, afterwards freedman, to king Polemon II., and then commander of the royal navy, took up arms with a design to rescue the kingdom from the Roman yoke. Being joined by great multitudes, drawn together with the prospect of spoil, he over-ran the country, and possessed himself of Trapesund, a city founded by the Grecians on the utmost confines of Pontus. Here he cut in pieces a cohort made up of the inhabitants, but which had been formerly presented with the privilege of Roman citizens: he likewise burnt the fleet, and scoured the neighbouring sea, Mucianus having called to Byzantium most of the Roman galleys. On this Vespasian, who was then in Syria, sent Verdius Gemnius into Pontus with a choice body of auxiliaries from the legions, who, assailing the enemy while they were in disorder, drove them into their vessels; then with some galleys he chased Anicetus into the mouth of the Chobus, where he thought himself safe under the protection of Sedochus king of the Lazians. Sedochus at first refused to deliver him up; but was soon prevailed upon, partly by threats, partly by presents, to surrender him and all the other fugitives who had taken sanctuary here. Thus ended that servile war; and the kingdom of Pontus continued to be a province of the empire till the time of David and Alexis Comneni, who being driven to Constantinople by the French and Venetians, A. D. 1204, under the command of Baldwin, earl of Flanders, settled, the one at Heraclea, the other at Trebisond. The troubles that arose among the Latins gave Alexis Comnenus an opportunity of erecting a new empire, which comprehended great part of Pontus, and was known by the name of the empire of Trebisond. The Comneni held it about 250 years, till the time of Mohammed II., who carried David Comnenus, the last emperor of Trebisond, prisoner to Constantinople, A. D. 1462, with all his family, and subjected his empire to that of Constantinople; under which Trebisond and all Pontus have continued ever since.

PONTUS EUXINUS, a sea at the west end of Colchis, between Asia and Europe, north of Asia; now called the Black Sea. See EUXINE.

PONTYPOOL, a market-town in Trevethan parish, Abergavenny hundred, Monmouth, Wales, nine miles north from Newport, and 150 west by north from London. This place has long been noted for its manufacture of japanned ware, to which it gives name, and consists of two principal streets. It is placed on the edge of a steep cliff, overhanging the Avon Lwyd, and on the slope of a declivity under impending hills. The town, which has risen in the course of the last century, owes its existence to the mineral treasures which lie in the surrounding country. Immense quantities of iron ore, coal, and limestone, are found here. The church is an ancient stone building, and here is a canal, lately cut, from Newport.

PO'NY, *n. s.* Corrupted from puny, as Dr. Johnson suggests: but qu. Wel *poun*, little? A small horse.

You must know that one day last week, as Lady Betty Curricle was taking the dust in Hyde Park, in a sort of duodecimo phaeton, she desired me to write some verses on her *ponies*. *Sheridan.*

PONZA, or PONTIA, a small island of the Tuscan Sea, to which many illustrious Romans were anciently banished.

POOL, *n. s.* Sax. pul; Belg. *poel;* Swed. *pol.* A lake or collection of standing water: a small collection of any liquid.

There is at Jerusalem, by the sheep-market, a *pool* which is called in the Hebrew tongue Bethesda, having five porches. *John* v. 2.

Moss, as it cometh of moisture, so the water must but slide, and not stand in a *pool.* *Bacon.*

Sea he had searched, and land,
From Eden over Pontus, and the *pool*
Mæotis. *Milton's Paradise Lost.*

The circling streams, once thought the *pools* of blood,
From dark oblivion Harvey's name shall save. *Dryden.*

After the deluge, we suppose the vallies and lower grounds, where the descent and derivation of the water was not so easy, to have been full of lakes and *pools.* *Burnet.*

POOLE (Matthew), a very learned writer in the seventeenth century, born at York in 1624. He was educated at Emanuel College, Cambridge, and afterwards incorporated in the university of Oxford. He succeeded Dr. Anthony Tuckney in the rectory of St. Michael de Quern, in London, about 1648. In 1658 he set on foot a project for maintaining youths of great parts at the two universities, and had the approbation of the heads of houses in both of them. He pursued the affair with so much vigor, that in a short time £900 per annum was procured for that purpose; but this design was laid aside at the Restoration. In 1662 he was ejected from his living for nonconformity. He was ten years employed in composing his Synopsis Criticorum, &c. Besides this great work, he published several other pieces. When Dr. Oates's depositions concerning the popish plot were printed, our author found his name in the list of those who were to be cut off, on account (as was supposed) of what he had written against the papists in his Nullity of the Romish Faith; so that he was obliged to retire into Holland, where he died in 1679, and left behind him the character of a very able critic and casuist.

POOLE, a borough, market, and sea-port town of Dorsetshire, is supposed to have taken its name from a bay or pool of water, called Lanford, which surrounds it on all sides but the north. The site of the town is thus a peninsula, joined to the parish of Lanford by a narrow neck of land.

It was a fort in the time of the Romans, and a military way may be traced from hence to Wimborne: the church of St. James was for-

merly a chapel of ease to Landford. The present church, which was erected in 1819-20, is capable of accommodating more than 2000 persons, is an elegant edifice, in the modern gothic style; in the chancel is a large handsomely painted window, representing Faith kneeling on the cross. The guildhall, situated nearly in the centre of the town, is a neat structure, in which all the business of the borough and town is transacted. Beneath this and round it the market is held every Monday and Thursday. The gaol stands in King Street: it is spacions, but to the credit of the town is seldom crowded with inmates. There is also a temporary place of confinement, called the Salisbury, situated in Salisbury Street. The custom-house, which is situated on the quay, is a new, commodious, and spacious erection.

The ancient history of this town is involved in obscurity; it is evidently of no great antiquity, for it is not mentioned in any records preceding the Norman conquest; it was originally a poor fishing village, but rose gradually into importance, and may date the commencement of its prosperity from the decay of the neighbouring town of Wareham. It seems to have undergone a great portion of the vicissitudes of fortune, as we have frequent mention of its alternate progress or decay, till 11 Henry VI., when the privileges of Melcombe were removed thence to Poole. From this period it uniformly prospered. During the civil wars it was a garrison for, and a strenuous defender of, the parliament. About this time it was fortified. By a charter of queen Elizabeth it was made a county of itself totally distinct from Dorsetshire; it consequently enjoys from that source, and from charters granted by other sovereigns, and by W. Longespée, earl of Salisbury, many high and distinguished privileges. Its government is vested in a recorder, a mayor, senior bailiff, and three other magistrates, a sheriff, and a water bailiff, who are annually chosen from among the burgesses and other minor officers. A petty session is held in the guildhall every Thursday, and the general quarter sessions are on the second Friday after those for Dorsetshire. It returns two members to parliament, who are chosen by the corporation, which consists of an indefinite number of burgesses: the manner in which these were originally so constituted has never, we believe, been correctly ascertained; the present mode is, when it is thought requisite to increase the number, for each resident burgess to nominate one; the present number is about 130.

It is a perpetual curacy, subject to the jurisdiction of Canford, but is exempt from any episcopal see.

The harbour which surrounds the town is acknowledged to be one of the finest in the kingdom, upwards of sixty miles in circumference, the bottom of every part of which consisting of soft black mud, it is impossible that a vessel can sustain injury by striking; the only inconvenience is to wait till the next tide. It is a peculiarity belonging to this harbour that the tide ebbs and flows twice in every twenty-four hours; and numerous as have been the surmises, no satisfactory account has yet been rendered of the cause of this phenomenon. The quay by which the town is nearly encircled is the most noble and safe in the united kingdom, being unrivalled for utility, spaciousness, good accommodation, and depth of water, which at all times admits vessels to lay along-side their landing places in perfect safety.

The principal manufacture here is that of cordage for shipping. A great trade is annually carried on between this port and the colonies of Newfoundland, whither the merchants export the necessaries required by the colonies, and in return receive fish, oil, and cranberries; the first of which articles they convey to foreign markets for disposal. This part of commerce much increased during the late war, since which time a greater trade has been carried on with other foreign parts, and this is now fast gaining ground. Much coasting business is also transacted here. Oysters of a very fine species are annually procured in vast quantities from beds in the harbour, which not only supply the town and neighbourhood, but are transported to London in great quantities; upwards of 200 sail of vessels belong to the harbour.

The town contains several dissenting meeting-houses, amongst which are an Independent, Quaker's, Unitarian, Baptist, Methodist, &c.

Poole is situated 108 miles south-west from London, six from Wimborne, ten from Christchurch, ten from Wareham, twelve from Ringwood, and fourteen from Blandford. In 1821 it contained 6390 inhabitants, 1180 houses.

POOLE'S-HOLE is a remarkable subterraneous cavern, about a mile from the crescent at Buxton. The entrance is very low and narrow, so that it is necessary for the visitor to stoop; but at the distance of thirty yards a spacious cavern opens, from the roof and sides of which water, continually dropping, congeals into large pillars and masses on the floor, forming a variety of fantastic figures. On reaching what is denominated the Flitch of Bacon, which is a large icicle depending from the roof, the cavern becomes again contracted; but a little further on it expands to a much greater height and width, till the visitor arrives at a large massy column of stalactites, called Mary Queen of Scots' Pillar. To explore this place farther it is necessary to descend a few yards by very slippery and uneven steps; at first the path at bottom is tolerably even and level, but at the distance of about twenty yards the passage rises with a perpendicular ascent, 240 feet, extremely difficult and dangerous. The Lady's Pillar and Curtain, the eye of St. Andrew's Needle, Break-Back Passage, Poole's Chamber and Closet, the names given to beautiful incrustations, successively arrest the attention in this long passage, which extends 460 yards, to Queen Mary's Pillar, and 100 yards beyond it. Behind Poole's Hole, on the edge of a vast hill, is a collection of whimsical habitations, called Ash-Hillocks, originally limekilns, and now inhabited by a numerous set of industrious laborers.

POONAH, or PUNA, a city of Bejapoor, the capital of the Mahratta Peshwa, and of the entire territory of the Mahrattas. It does not cover more than about two square miles, and is but indifferently built. The British residency is at the Sungum. At the bottom of the Savaveeti Hill is a large field

enclosed with high brick walls, where the Peshwa assembles the brahmins, to whom he gives alms when the rainy season terminates, who, on this occasion, beg their way hither from all parts of India. To the eastward of the city there are mythological excavations resembling those of Carli and Elephanta, but of a very inferior description.

The Moota washes the city on the north side, and forms its junction here with the Moola. It is about 200 yards broad, and so shallow in the dry season that no bridge has been hitherto built here.

The Peshwa Bajeerow was a son of the famous Ragobah (Ragoonauth Row) of bad memory. His predecessor, Madhurow, the young Peshwa, died suddenly the 27th of October, 1705, when this prince was raised to the sovereignty, but was repeatedly dethroned and reinstated by contending chiefs. His alliance with the British, concluded at Bassein on the 30th December, 1802, established his power, however, and the government has ever since remained undisturbed.

The suttee, or burning of widows with their husbands' corpse, is very frequent at Poonah; and the immolation is usually performed at the junction of the Moota and Moola, close to the British residency. The population probably exceeds 100,000.

Travelling distance from Bombay ninety-eight miles; from Hyderabad 387; from Oojain 442; from Nagpoor 486; from Delhi 913; and from Calcutta, by Nagpoor, 1208 miles.

POOP, *n. s.* Fr. *pouppe;* Lat. *puppis.* The hindmost part of the ship.

Some sat upon the top of the *poop* weeping and wailing, till the sea swallowed them. *Sidney.*

He was openly set upon the *poop* of the galley. *Knolles.*

The *poop* was beaten gold. *Shakspeare.*

Perceiving that the pigeon had only lost a piece of her tail through the next opening of the rocks, they passed safe, only the end of their *poop* was bruised. *Raleigh.*

With wind in *poop*, the vessel ploughs the sea,
And measures back with speed her former way.
Dryden.

POOR, *adj* & *n. s.*
POOR'LY, *adv.*
POOR'NESS, *n. s.*
POOR-SPIRIT'ED, *adj*
POOR-SPIRIT'EDNESS, *n. s.*
Fr. *pauvre;* Span. and Port. *potre;* Ital. *povero;* Lat. *pauper.* Indigent; necessitous; in want; barren; dry; starved spiritless; flaccid; unhappy; mean; low; depressed; paltry; trifling; contemptible; used as a word of tenderness or pity, and as a word of contempt: the poor, for the noun substantive is always used collectively, signifies those of the lowest rank in life; any not rich: poorly and poorness follow all the senses of the adjective: poor-spirited means cowardly; mean-spirited.

Pore men ben taken to prechyng of the gospel. *Wiclif. Matt.* 11.

He that giveth to the *poor* shall not lack. *Prov.* xxviii. 27.

Those thieves spared his life, letting him go to learn to live *poorly.* *Sidney.*

Poor cuckoldly knave—I wrong him to call him *poor;* they say he hath masses of money. *Shakspeare.*

I have very *poor* and unhappy brains for drinking. I could wish courtesy would invent some other entertainment. *Id.*

Your constancy
Hath left you unattended: be not lost
So *poorly* in your thoughts. *Id. Macbeth.*

A conservatory of snow and ice used for delicacy to cool wine, is a *poor* and contemptible use, in respect of other uses that may be made of it. *Bacon.*

A soothsayer made Antonius believe, that his genius, which otherwise was brave, was, in the presence of Octavianus, *poor* and cowardly. *Id.*

If you sow one ground with the same kind of grain, it will prosper but *poorly.* *Id.*

The *poorness* of the herbs shews the *poorness* of the earth, especially if in color more dark. *Id.*

And if that wisdom still wise ends propound,
Why made he man, of other creatures, king;
When, if he perish here, there is not found
In all the world so *poor* and vile a thing? *Davies.*

No less I hate him than the gates of hell,
That *pooreness* can force an untruth to tell.
Chapman.

Where juice wanteth, the language is thin, flagging, *poor*, starved, and scarce covering the bone. *Ben Jonson.*

You meaner beauties of the night,
That *poorly* satisfy our eyes,
More by your number than your light,
You common people of the skies;
What are you when the sun shall rise? *Wotton.*

The marquis, making haste to Scarborough, embarked in a *poor* vessel. *Clarendon.*

Vext sailors curse the rain,
For which *poor* shepherds prayed in vain.
Waller.

From a confined, well-managed store,
You both employ and feed the *poor.* *Id.*

Vain privilege, *poor* women have a tongue;
Men can stand silent, and resolve on wrong.
Dryden.

The *poor* dare nothing tell but flattering news.
Id.

Nor is their courage or their wealth so low,
That from his wars they *poorly* would retire. *Id.*

Never any time since the reformation can shew so many *poor* amongst the widows and orphans of churchmen, as this particular time. *Sprat.*

If a prince should complain of the *poorness* of his exchequer, would he be angry with his merchants, if they brought him a cargo of good bullion? *Burnet's Theory*

When he delights in sin, as he observes it in other men, he is wholly transformed from the creature God first made him: nay, has consumed those *poor* remainders of good that the sin of Adam left him. *South.*

Has God cast thy lot among the *poor* of this world, by denying thee the plenties of this life, or by taking them away? this may be preventing mercy; for much mischief riches do to the sons of men. *Id.*

A cause of men's taking pleasure in the sins of others, is, from that meanness and *poor-spiritedness* that accompanies guilt. *Id.*

We have seen how *poor* and contemptible a force has been raised by those who appeared openly. *Addison's Freeholder.*

There is a kind of sluggish resignation, as well as *poorness* and degeneracy of spirit, in a state of slavery. *Addison.*

Poor, little, pretty, fluttering thing,
Must we no longer live together?
And dost thou prune thy trembling wing,
To take thy flight thou know'st not whither?
Prior.

That I have wronged no man will be a *poor* plea or apology at the last day; for it is not for rapine that men are formally impeached and finally condemned; but I was an hungry, and ye gave me no meat. *Calamy's Sermons.*

Who builds a church to God and not to fame,
Will never mark the marble with his name;
Go search it there, where to be born and die,
Of rich and *poor* makes all the history. *Pope.*

To be without power or distinction is not, in my *poor* opinion, a very amiable situation to a person of title. *Swift.*

Matilda is so intent upon all the arts of improving their dress, that she has some new fancy almost every day; and leaves no ornament untried, from the richest jewel to the *poorest* flower. *Law.*

The *poor* monk never saw many of the decrees and councils he had occasion to use. *Baker.*

Teach the old chronicle, in future times,
To bear no memory but of *poor* rogue's crimes. *Harte.*

Mirvan! *poor-spirited* wretch! thou hast deceived me. *Dennis.*

A man may hae an honest heart,
Though *poortith* hourly stare him;
A man may tak a neebor's part,
Yet hae nae cash to spare him. *Burns.*

Poor Laws. Of the various and complicated statutes of our law relating to the poor we cannot be expected to present our readers with more than a very brief summary; and after the labors of Mr. Const and Mr. justice Burn, and his continuators in this department of jurisprudence, even professional readers can require little more. We shall follow up our brief statement of the existing laws with some reflections on their political and moral character, and general tendency.

Of Overseers.

1. *Of the appointment of overseers.*—All persons, of whatever age or sex, are primâ facie liable to serve as overseers, unless they can show some legal exemption to except them. That a woman may be appointed overseer, see 2 Term Rep. K. B. 395. It is said that all peers of the realm, by reason of their dignity; clergymen, by reason of the order; members of parliament, by reason of their privileges of parliament; and attornies, by reason of the necessity of their attendance at Westminster-Hall; are exempted from being chosen overseers, even where there is a special custom in the parish for every inhabitant to serve; it is admitted that practising barristers also have the same privilege. It has also been held that an alderman of London ought to be discharged from serving parish offices, on account of his necessary attendance on the duties of the corporation. Persons also of other particular professions and descriptions are exempted, by divers statutes; as the president and members of the college of physicians, in London. Stat. 32 Hen. VIII. c. 40. Surgeons, being freemen of the corporation of surgeons, in London, for so long a time as they shall practise. Stat. 18 Geo. II. c. 15; and it is said, surgeons in general, by special custom, at common law. Apothecaries, free of the apothecaries' company, and every person using and exercising the said art, who has served as an apprentice to it for seven years, while they practise, stat. 6 and 7. W. III. c. 4. Dissenting ministers, who shall conform to the directions of the toleration act, stat. 1 W & M. c. 18, and dissenters in general are allowed to serve the office by deputy. Prosecutors of felons to conviction, who shall apprehend and take any person guilty of burglary, or privately stealing from the shop. Stat. 10 and 11 W. III. c. 33. Soldiers serving in the militia during the time of service; and, perhaps, it may be considered, that those who are exempted from serving the office of churchwarden, are also exempted from serving the office of overseer. It has also been said that persons who are only occasional residents in a parish, ought not to be appointed; and it seems clear that absentees, or persons who do not reside, but only hold land in the parish, cannot be chosen. The appointment must be under the hands and seals of two justices, pursuant to the direction of the stat. 43 Eliz. c. 2. and, therefore, it cannot be made by the sessions, nor by the mayor of a corporation, conjointly with the justice of a county; but, if there should happen to be only one justice in a county, perhaps he alone may appoint. It is, however, completely determined, that the two justices must sign and seal the appointment in the presence of each other; for it is not merely a ministerial but a judicial act, wherein the justices are to exercise their discretion.

The justices cannot appoint more than four overseers for any parish, unless the parish be divided into two or more divisions or townships, each separately maintaining its own poor. After an appointment of four overseers by magistrates at one meeting, the magistrates are functi officio; and no other magistrates can afterwards, upon a claim of exemption by one of the persons so appointed, appoint another in his place; but the party must appeal to the sessions to get his discharge. It seems to be settled that no overseer can be appointed for any place that is not, in contemplation of law, a vill; and therefore, if a place that is extra-parochial come within the notion of a vill, overseers may be appointed for the purpose of obliging the inhabitants to provide for their own poor. But it is a subject that has been much litigated what kind of place shall be so considered.

The justices ought not to appoint separate overseers for distinct parts of a parish, under stat. 13 and 14 Car. II. c. 12, unless necessity for this can be evinced by the inability of a parish to reap the benefit of the stat. 43 Eliz. c. 2. When a parish is thus divided into separate townships, each township is to be considered as a distinct parish.

The appointment cannot be removed into the court of king's bench before the time for appealing is expired; for it would deprive the party of his right of appeal. This appeal may be made as well by the parishioners as by the persons who are appointed overseers. 3 Term Rep. K. B. 38.

By stat. 59 Geo. III. c. 12, sect. 6, persons assessed to the poor rates, and resident out of the parish (but within two miles of the church), may be appointed overseers; and by sect. 7 of the same act assistant overseers may be nominated by the parish, in vestry, with a yearly

salary; who shall receive their appointment under the hands and seals of two justices.

2. *Of their accounts.*—It is provided, that overseers shall, within four days after the end of their year, after other overseers nominated, make and yield up to two justices, true and perfect accounts of all monies by them received, or rated and assessed, and not received; and also such stock as shall be in their hands or in the hands of the poor to work, and of all other things concerning their office; and pay over the balance to the succeeding overseers. Stat. 43 Eliz. c. 2. sect. 2. The succeeding overseers may, by distress, levy the sums of money or stock which shall be behind, upon any account so made; in defect of distress, the offender may be committed to the common gaol until payment of the arrears; two justices may commit overseers, who shall refuse to account, until they make a true account, and pay over the balance in their hands. Sect. 4. Overseers shall not bring into their account any money, given to the relief of a poor person, not registered in the parish books, as a person entitled to receive collections, on pain of £5.

The overseers shall, within fourteen days after other overseers are appointed, deliver to such succeeding overseers a true and just account, in writing, fairly entered in a book or books to be kept for that purpose, and signed by the overseers; such account to be verified on oath before one justice, who shall sign and attest the caption of the same at the foot of the account; and the overseers shall deliver over all the stock, and pay the balance, remaining in their hands, to their successors; these books of account to be carefully preserved in some public place; and copies thereof delivered, if required, to any person assessed. Stat. 17 Geo. II. c. 38. sect. 1. If any overseer shall refuse or neglect to account and pay the balance, as aforesaid, two justices may commit such overseer until he complies.

By stat. 50 Geo. III. c. 49, in all cases when any such account is required to be made under 17 Geo. II., it shall be submitted by the churchwardens and overseers to two justices at a special sessions within the fourteen days, and such justices may examine into the matter of such account, and administer an oath to the party as to the truth thereof, and may disallow charges; which account shall be signed by such justices; overseers and churchwardens, neglecting or refusing to yield up, submit, or verify, such accounts, or to deliver over to their successors within ten days, any goods, &c., remaining in their hands, shall be committed to gaol until compliance; and, upon neglecting to pay over within fourteen days money in their hands, it shall be levied by distress and sale of their goods; and, in default of distress, shall be committed till payment. Parties aggrieved may appeal to quarter sessions, sect. 2, 3.—Saving the rights of magistrates of corporations, sect. 4. This act not to extend to places exempted from accounting under former acts, sect. 6. The provisions of this latter act are not a substitution in lieu of those in 17 Geo. II., but are cumulative; and, if the overseer refuse to deliver in such accounts to his successor within fourteen days, he may be committed by two justices for that refusal.

The sessions, upon an appeal against the allowance of overseers' accounts, may, if they see reason, disallow of the accounts, and order the overseers to pay over such balances as they shall adjudge to be due to the parish; but, if they refuse so to do, the sessions cannot commit, but must levy the arrears pursuant to the direction of the stat. 43 Eliz. c. 2, sect. 4. So also the sessions may, upon an appeal, set aside the allowed account, and order a re-examination of the account by two justices; but the accounts must be previously allowed by two justices, or the sessions cannot receive an appeal.

It has been heretofore doubted how far overseers who have laid out their money upon the maintenance of the poor were to be reimbursed after they were out of office. By stat. 41 Geo. III. (U. K.) c. 23, sect. 9, succeeding churchwardens and overseers are empowered to reimburse to their predecessors in office any money expended for relief of the poor, while there was no rate, or during an appeal: and the quarter sessions, on application, shall make an order for that purpose.

3. If any *action of trespass or other suit* be brought against any person taking a distress, making of any sale, or any other thing done by authority of the act, they may plead that it was done by virtue of the act; and if a verdict be for the defendant, or the plaintiff be nonsuited after appearance, the defendant shall recover treble damages and costs. Stat. 43 Eliz. c. 2, sect. 19.

When any distress shall be made for a poor's-rate, the distress itself shall not be deemed unlawful, nor the parties making it deemed trespassers, on account of any defect or want of form in the warrant for the appointment of such overseers; or in the rate of assessment; or in the warrant of distress thereon; nor shall the party distraining be deemed a trespasser ab initio, on account of any subsequent irregularity; but the parties injured may have their action of trespass, on the case, at their election; and, if the plaintiffs recover, they shall have full costs; provided no such plaintiffs shall have any action for such irregularity, if tender of amends has been made before action brought. Stat. 17 Geo. II. c. 38, sect. 8.

Churchwardens and overseers shall meet together at least once a month in the church, upon a Sunday in the afternoon, after divine service, to consider of business respecting the poor; upon pain of forfeiting 20*s.* for every neglect. Stat. 43 Eliz. c. 2, sect. 2.

If any overseer (or other officer of any parish) shall neglect, or refuse to obey and perform the several orders and directions in the statute particularised, or any of them, if no penalty is specifically provided, he shall forfeit, not exceeding £5, nor less than 20*s.* Stat. 17 Geo. II. c. 38, sect 14.

Overseers also may be indicted for refusing to accept of and undertake the office, or for refusing to make a rate to reimburse constables for the apprehending of vagrants, under stat. 17 Geo. II. c. 1, sect. 1; or for refusing to account, within the time limited, for the monies they have received for the relief of the poor; or

for not relieving the poor; or for relieving them unnecessarily; or for disobeying a legal order of justices; or for not receiving a pauper when sent to their parish under an order of removal; or for cruelty in the removal of poor women with child: so also the court will grant an information against an overseer for fraudulently contriving to remove a poor person in order to prevent him from becoming chargeable to the parish; or for contriving to marry a pauper, or for giving a man money to marry a woman who was with child, in order to prevent the child from being a burden to the parish; but the court will not grant an information against an overseer for making an alteration in a poor's-rate, after it had been allowed by two justices, if the alteration appear to have been made with approbation of the justices. Nor can an overseer be adjudged guilty of absenting himself from the monthly meetings appointed by stat. 43 Eliz. c. 2, until he has had personal notice of his appointment; and if he be appointed, under stats. 13 and 14 Car. II. c. 12, an overseer in an extra-parochial place, he is not liable to this penalty.

Of Poor Rates.

1. The churchwardens and overseers, or the greater part of them, shall take order, from time to time, with the consent of two justices, to raise, weekly or otherwise (by taxation of every inhabitant, parson, vicar, and every other occupier of lands, houses, tithes impropriate, propriations of tithes, coal-mines, or saleable underwood in the parish, in such competent sums as they shall think fit): 1. A sufficient stock of materials to set the poor on work. 2. Competent sums of money to relieve the lame, impotent, old, blind, and indigent. 3. To put out poor children apprentices. And, 4, For doing and executing all other things concerning the premises, as to the overseers shall seem convenient. Stat. 43 Eliz. c. 2, sect. 1.—The mayors, or other head officers of corporations, shall have the same authority within their respective jurisdictions, both in and out of sessions, as is given to county justices; and every alderman of London, within his ward. Sect. 8. As this latter clause restrains the magistrates and justices to the limits of their respective jurisdictions, the justices for a county cannot allow a rate made by the overseer of a borough. 2 Const. 62.

The justices of the counties, in which separate overseers shall be appointed for particular townships and villages, shall have the like authority to raise and levy monies, and to do and execute every thing in such townships and villages, as is given them in any parish where the overseers are appointed, under stat. 43 Eliz. c. 2; stat. 13 and 14 Car. II. c. 12, sect. 22. The justices and parish officers of a distinct jurisdiction, as of the precinct of the cathedral church, at Norwich, may, therefore, be compelled, by a mandamus, to make a rate.

Public notice in the church shall be given, by the overseers, of every poor's-rate allowed by the justices, the next Sunday after such allowance; and no rate shall be valid, to collect and raise the same, unless such notice shall have been given. Stat. 17 Geo. II. c. 3, sect. 1. In trespass, on a distress for non-payment of a poor's-rate, the publication of the rate must be proved.

The overseers shall permit the inhabitants of the parish, &c., to inspect every such rate at all seasonable times, paying 1*s.*; and shall give copies at the rate of 6*d.* for every twenty-four names; or, on refusal or neglect, forfeit £20. True copies of all poor's-rates shall also be entered in a book, within fourteen days after the determination of all appeals; to be attested by the overseers, and kept for public perusal, under penalty of from £5 to 20*s.* where no other penalty is provided. Stat. 17 Geo. II. c. 38, sects. 13, 14. Overseers, where there are no churchwardens, may do, perform, and execute, and shall be liable as to all matters relating to the poor, sect. 15. The rate which the churchwardens and overseers are, by these statutes, authorised to make, must be assessed only on the visible property, both real and personal, which the occupier or owner may have within the parish; and not according to the amount of the property which a person, rated as an inhabitant, may have out of the parish. The general rule seems to be that every species of property, lying within the parish, which has an occupier, and from which an annual profit arises, is rateable.

2. The *time* for which a poor's rate ought to be made seems to be left to the discretion of the overseers. The statute of 43 Eliz. c. 2, says, 'weekly or otherwise.' In one case, it is said, that it ought to be monthly, because the possessors are to pay, and possessions frequently change; this rule is confirmed by Burrow, but denied by Bott, who states a dictum of lord Mansfield, that a poor's-rate might as well be made for three months as for one month; and Holt, chief justice, assigned as a reason against making poor's rates quarterly, that by this means a man cannot move in the middle of the quarter, but he must be twice charged. The legislature, however, has provided against this by statute 17 Geo. II. c. 38, sect. 12, which enacts, 'That when any person shall come into, or occupy any premises, from which any person assessed shall be removed, or which at the time of making the rate were empty, every person, so removing or coming in, shall pay the rate, in proportion to their respective occupations.'

3. The *purposes* also for which a poor's-rate is made must be conformable to the direction of the statute 43 Eliz. c. 2; and therefore a rate cannot be made to reimburse former overseers, for monies expended to the use of the poor, or to defray law charges; for an overseer is not bound to lay out the money until he has it; but if the monies, on any rate made by preceding overseers, be not raised at the expiration of their offices, the successors may, by statute 17 Geo. II. c. 38, sect. 11, raise it and reimburse them. By stats. 13 & 14 Car. II. c. 12, sect. 18, a rate may also be made for reimbursing constables such monies as they shall have expended in relieving the poor, in conveying them with passes; and in carrying rogues, vagabonds, and sturdy beggars to houses of correction.

The rate must be made in equal proportion,

on all the persons assessed, according to their respective properties; and, therefore, a pound rate on the rent of lands and houses, and the amount of the interest of personal property, is said to be the most fair and reasonable assessment: but this is denied to be the rule; for the circumstances of a man of landed property may differ in proportion as his family is large or small, and personal property is in a continual state of fluctuation; and, therefore, neither rent nor land tax ought to be considered in the making of a rate; but the overseers, taking their former assessments as their best guide, are to proportion rates according to their best direction; and, if they make it unequal, the sessions on appeal will correct it; for the sessions are the ultimate judges of the proportion and equality of the rate. A poor's-rate made upon three-fourths of the yearly value of land, and upon one moiety of the yearly value of houses, is not disproportionate or unequal. A rate made on one-half of the full yearly value or net rent of farms, and taking one-twentieth part of all stock, personal estate, and money out at interest, valuing the interest of such twentieth part at four per cent. and then rating one moiety of such twentieth part, varying the proportion as circumstances require (for the overseers cannot make a standing rate), is a good and equal rate. A rate on lands and houses, at one penny in the pound, without making any distinction between farm dwelling-houses and cottages, although they had been before rated in different proportions, is not an unequal rate; for whether houses are to be rated to the poor in a different proportion from land must depend on local circumstances. But of those equalities and proportions, the sessions are ultimately to judge. The appeal to the sessions may, by 43 Eliz. c. 2, sect. 4, be to any general quarter sessions; but by 17 Geo. II. c. 38, sect. 4, it must be on reasonable notice given to the next sessions, general or quarter.

Upon all appeals from rates, the session may, by stat. 17 Geo. II. c. 38, amend the rate, without altering it with respect to other persons. Upon an appeal from the whole rate, if it shall be found necessary, the sessions may, in their discretion, quash the rate, and direct the overseers to make a new equal rate. The sessions cannot strike out the name of a person from the poor's rate; so if the name of any person be omitted, the session must quash the rate, and cannot amend it by inserting his name. But it seems agreed that, where a person is overcharged in a poor's-rate, the sessions may relieve him, on appeal, by lessening the sum assessed on him. A parishioner who is liable to be rated, but who in fact is not rated, is a competent witness to prove that the person, whose name is omitted, is liable to be rated. The justices in session shall cause defects of form in appeals to be amended without costs; and by stat. 41 Geo. III. (U.K.) c. 23. For the better collection of the poor's-rates, it is enacted that on appeal from any poor-rate the quarter sessions may amend it without quashing it.

If a poor-rate be legal on the face of it, though stated to be made for illegal purposes, the court will not quash the rate; but will leave the parties aggrieved to appeal against the allowance of the overseer's accounts. An appeal in London or Middlesex must, as in all other counties, be made to the next practicable general quarter sessions: the stat. 17 Geo. II., in its terms, gives the appeal to the next general or quarter sessions. 15 East's Rep. 632.

4. The present, as well as the subsequent overseers may, by warrant from two justices, levy the sums of money assessed for the poor's-rates, and all arrears thereof, of every one that shall refuse to contribute according as they shall be assessed, by *distress and sale* of the offender's goods, rendering the party the overplus; and, in defect of such distress, two justices may commit the defaulter till payment. Stat. 43 Eliz. c. 2, sect. 4. The goods of any person assessed may be distrained, not only in the place for which the assessment is made, but in any other place within the same county or precinct; and if sufficient distress cannot be found there, on oath before a justice of any other county or precinct, goods in such other county or precinct may be distrained. Stat. 17 Geo. II. c. 38, sect. 7.

Justices granting distress-warrants shall therein order the goods distrained to be sold within a certain time limited in the said warrant, not less than four nor more than eight days; unless the penalty and charges of distress be sooner paid. Stat. 27 Geo. II. c. 20, sect. 1.

Justices may act in all matters relating to the poor laws, notwithstanding they are rated to or chargeable with taxes or rates, within the parish or place affected by the acts of such justices. Stat. 16 Geo. II. c. 18, sect. 1. And a rate may be distrained for before the time for which the rate is made is expired; but, if the landlord of the premises tender the rate, the overseers are bound to receive it, although the tenant is not rated; and, if they make an excessive distress, they are liable to a special action on the case. The granting of such warrant of distress is a judicial, not ministerial act: and the magistrates ought first to summon the party and hear what he has to say. 7 Term Rep. K. B. 270.

Parishes may even be rated *in aid*; for, by the said stat. 43 Eliz. c. 2, if the justices perceive that the inhabitants of any parish are not able to levy, among themselves, sufficient sums of money for the purposes of the act, the said two justices may rate any other (inhabitants) of other parishes, or out of any parish within the hundred where the said parish is, to pay such sum or sums of money to the churchwardens and overseers of the poor parish as the said justices shall think fit: and if such parish, so rated, is not able to pay the sum assessed, then the sessions may rate any other inhabitants of other parishes, in or out of any parish within the county, for the purposes aforesaid, sect. 3. The two justices or the sessions, as the case may happen to be, are, under this clase of the act, to order the quantum of money which they think ought to be raised in aid of the poor of the parish; but the overseers must make the rate on those who are to pay it.

An order for taxing one parish in aid of another, under the said act 43 Eliz. was held good,

although the two parishes were, by act of parliament, incorporated with others, for maintenance of the poor: there being a special proviso that nothing should extend to repeal the powers of 43 Eliz. as to taxing parishes in aid of others. 2 East's Rep. 417.

Of the Management and Relief of the Poor.

Overseers are to set to work all such children whose parents shall not be thought able to maintain them; and all such persons, married or unmarried, who have no means to maintain themselves, and use no ordinary and daily trade to get their living by; to relieve, as has been already noticed, the lame, impotent, old, blind, and such other among them, being poor and not able to work; and to put out poor children apprentices. Stat. 43 Eliz. c. 2, sect. 1; and the justices, or any one of them, may send to the house of correction, or common gaol, such poor persons as shall not employ themselves according to the direction of the overseers, sect. 4. —The majority of the church-wardens and overseers, by leave of the lord of the manor, whereof any waste or common within the parish shall be parcel, and by order of sessions, may build on such waste or common, at the charge of the parish, convenient houses for the impotent poor, sect. 5. The overseers, with the consent of two justices, may set up any trade or manufactory for the employment and relief of the poor. Stat. 3 Car. I. c. 4, sect. 22.

The sessions may set poor prisoners on work, and expend the profit arising from their labor towards their relief; but no parish shall be rated above 6d. a week on this account. Stat. 19 Car. II. c. 4. Other provisions are also made by the same statute for the relief and removal of sick prisoners.

There shall be kept in every parish, at the charge of the parish, *a book* or books wherein the name of all such persons who do or may receive collection shall be registered, with the day and year when they were first admitted to have relief, and the occasion which brought them under that necessity. Yearly, in Easter week, or as often as it shall be thought convenient, the parishioners of every parish shall meet in vestry, before whom the said book shall be produced; and all persons receiving collections shall be called over, and the reasons of their taking relief examined, and a new list made and entered as shall be thought fit, to receive collection; and no other person shall be allowed to have or receive parish collection, but by authority under the hand of a justice residing in the parish, or, if none be there dwelling, in the parts near or next adjoining, or by order of quarter sessions, except in cases of pestilential diseases, and then only such families as are infected. Stat. 3 and 4 W. & M. c. 11, sect. 11.

No justice shall order relief to any poor person, until oath be made before him of some matter which he shall judge a reasonable cause or ground for having such relief, and that the same person had applied to the parish for relief, and was refused: and until such justice has summoned two of the overseers to show cause why such relief should not be given. Stat. 9 Geo. I. c. 7, sect. 1.—The person, whom the justice shall order to be relieved, shall be entered in the books, as a person entitled to receive collections, as long as the cause of such relief continues, and no longer, sect. 2.

For the greater ease of parishes, the church-wardens and overseers, or the major part of them, with the consent of the major part of the parishioners, may purchase houses, or contract with persons for the maintenance of the poor; and such persons shall have the benefit of their work and labor; and when any parish shall be too small to purchase or hire such workhouse, two or more such parishes, with the consent of the majority of their respective parishioners, may unite in purchasing or hiring such house: but, by 45 Geo. III. c. 54, no contract for maintaining the poor shall be valid, unless the contractor resides in the parish where the poor are to be maintained, and security is given for the due performance of the contract.

The seventh section of 9 Geo. I. c. 4 is repealed, with respect to any parish, township, or place, which shall adopt the provisions continued in stat. 22 Geo. III. c. 83 (explained by stat. 33 Geo. III. c. 35), for the establishment of houses of industry, and incorporated societies, for the maintenance of the poor. That act lays down many excellent regulations for the furthering the wholesome purpose of protecting and relieving the poor; by appointing guardians of the poor, and governors and visitors of the poor-houses; under restrictions, which, if adopted, would probably remedy many evils now attendant on the poor laws. By stat. 49 Geo. III. c. 124, sect. 5, two justices in petty sessions, may direct the regulations of 22 Geo. III. c. 83, to be executed in any parishes within their divisions, as fully as in those incorporated by that act.

Paupers refusing to work, or getting drunk, or otherwise misbehaving, may be committed to the gaol or house of correction, and kept at hard labor, not exceeding twenty-one days, sect. 5.—Persons having the management of the poor not to be concerned in contracts, on penalty of £100; sect. 6.

By stat. 54 Geo. III. c. 170, sect. 7, no master, governor, or person superintending houses for the reception of poor persons, or churchwardens, overseers, or any other person having the management of the poor, shall punish corporally any adult person under his care, for any misbehaviour, nor confine any such person longer than twenty-four hours, or till they can be conveyed before a magistrate.

By stat. 55 Geo. III. c. 137 justices may direct a relief, under 36 Geo. III. c. 23, to be paid to such persons, during such times as the justice shall think proper, not exceeding three months, with power to make any further order for any time not exceeding six months, and so on from time to time, as occasion shall require, sect. 3.—Sums ordered to be paid for any longer period than a month, shall not exceed 3*s*. a week for each person, or three-fourths of the average weekly expense paid by the parish, on which such order shall be made for the maintenance of each per-

son in the workhouse, sect. 4. Justices of peace, and physicians, apothecaries, or clergymen authorised by them, may visit parish workhouses; and two justices may make order for relieving the sick poor therein. Stat. 30. Geo. III. c. 49. And the sessions, as well as the single justice, may make original orders for the relief of the poor.

By stat. 56 Geo. III. c. 129, for repealing certain provisions in local acts for the maintenance and management of the poor; after reciting that divers local acts had passed, containing enactments relative tc the maintenance and regulation of the poor, varying the general law with respect to particular parishes, &c., it is enacted that all enactments and provisions in any act passed since the beginning of the reign of king George I., of the following nature, should be repealed: viz. whereby any poor persons, not actually applying for, and receiving relief, are compellable to go or remain in any house of industry or workhouse; or may be kept therein, at the discretion of the governors or overseers, &c., after they are capable of maintaining themselves, or until the charges of the parish in the maintenance of them or their families shall be reimbursed; or whereby poor children are rendered liable to be apprenticed to the governor, &c., of any workhouse, &c.; or whereby any parish, &c., at a greater distance than ten miles from the workhouse, &c., may become contributors thereto; or whereby governors, &c., of any workhouse, &c., are empowered to hire out the poor of full age, or to contract with any person for the profit of the labor of such poor.—And, by the same act, it is enacted that it shall not be lawful for any governor, director, guardian, or master of any house of industry or workhouse, on any pretence, to chain, or confine by chains or manacles, any poor person of sane mind.

Militia-men and their substitutes are relieved according to the provisions of the several militia acts, and other acts of parliament, viz. stats. 19 Geo. III. c. 72; 33 Geo. III. c. 8, sect 1; 34 Geo. III. c. 47; and particularly stat. 35 Geo. III. c. 81; 43 Geo. III. c. 47, stat. 2, c. 5.

The father and grandfather, and the mother and grandmother, and the children, of every poor old, blind, lame, and impotent person, or other person not able to work, being of sufficient ability, shall, at *their own charges*, relieve and maintain every such poor person, at the rate the justices in sessions shall assess, on pain of 20*s*. a month. Stat. 43 Eliz. c. 2, sect. 7.—The penalties levied, for disobeying such order of maintenance, shall go to the relief of the poor, sect. 11. The justices of the county or place in which the rich relation, and not where the poor relation, dwells, have alone authority to make this order, and to assess the rate of maintenance.

This statute extends only to natural relations, and not to relations in law; and it seems that, in default of one relation, another may be compelled to relieve the pauper; as in the case of grandfather, father, and child; the father being incapable of maintaining the child, the grandfather may be compelled, if of sufficient ability; and therefore a man is not obliged to maintain his son's wife, nor his wife's mother, nor his wife's child by a former husband. And it seems to be now settled, that it makes no difference, whether the wife be alive or dead at the time her poor relations require relief, contrary to some former determinations on this subject. It is said, also, that a wife cannot be ordered to maintain her grandchild, nor the husband of a grandmother to maintain her grandchild; but if an order of maintenance be made on a grandmother, and she afterwards marries, the husband shall be liable (during her life) to the maintenance.

By 11 and 12 W. III. c. 4 the Protestant children of Popish parents may obtain relief by application to the court of chancery; and by stat. 1. Ann, c. 30, the same is enacted with respect to the Protestant children of Jews.

As to relieving deserted families.—Persons running away from their families, and leaving them on the parish, are declared to be incorrigible rogues; and if either man or woman shall threaten to run away, and leave their families on the parish, the same being proved by two witnesses, on oath before two justices, they shall be sent to the house of correction or give security to the parish. Stat. 7. Jac. I. c. 4, sect. 8. See VAGRANTS.

By 59 Geo. III. c. 12, sect. 1—5, parishes are empowered to establish select vestries for the concerns of the poor, to consist of a certain number of householders (not more than twenty, nor less than five), elected by the parishioners at a vestry, and then appointed by the justices at sessions, together with the minister, churchwardens, and overseers; and such select vestry is authorised to examine into the state and condition of the poor, the proper objects for relief, the nature and amount of the relief to be given, and to enquire into and superintend the collection and administration of all money raised by poor rates, and of all other funds and money raised, or applied by the parish for relief of the poor. The overseers are required to conform tc the directions of the vestry; and not to give any relief (except in cases of emergency, and under the order of a justice of peace), other than ordered by the vestry. In parishes not having select vestries, under this act all orders for relief of the poor are to be made by two justices, except in emergency, for fourteen days by one justice. By sect. 9 parishes are enabled to rent or purchase land for building or enlarging workhouses in the parish, or some adjoining parish; to provide land for the employment of the poor: the expense not to exceed a rate of 1*s*. in the pound per annum. By sect. 24, 25, a summary remedy is provided, on application to two justices, for obtaining possession of any nouses or lands belonging to parishes, upon one month's notice. Sect. 27 facilitates the mode of obtaining relief, in cases of parishes incorporated under 22 Geo. III. c. 83. By sect. 29, &c., overseers are empowered to give relief by way of loan; and pensions for services in the army, navy, &c., and the wages of seamen are made available, as a security or indemnity to the parishes affording relief to the parties entitled to such pensions or wages.

Of Settlement.

At present there are ten modes whereby persons may gain a settlement; which entitles them to claim, and receive relief from the parish in which they are settled, whenever such relief is necessary; and, if this happens while the pauper resides in a parish where he or she is not settled, they are to be removed to their place of settlement; under the regulations of the law. These are, 1. By birth, as in the case of bastards. 2. By parentage, as where the father of a legitimate child was settled. 3. By marriage. 4. By residence of forty days. 5. By renting a tenement of the value of £10 a year. 6. By paying taxes for such a tenement. 7. By holding a public annual office. 8. By hiring and service. 9. By apprenticeship. 10. By residence on a man's own estate worth £30. Into the minuter distinctions of the acts of settlement we cannot here enter.

Many alterations in the general law of settlements having been made by several local acts, it was, by stat. 54 Geo. III. c. 170, enacted that all enactments contained in any act of parliament since the commencement of the reign of Geo. I., whereby any alteration is made in respect of gaining or not gaining a settlement within any particular district, parish, &c., shall be repealed; and that every person shall be deemed to have acquired and acquire a settlement in every such district or parish by any means they would or might have done or do, in case such acts had not been made. All such parishes, &c., are therefore now subject to the general laws of settlement.

By 59 Geo. III. c. 50, reciting that many disputes had arisen respecting the settlement of the poor, by the renting of tenements, it is expressly enacted that no person shall acquire a settlement in any parish, by dwelling for forty days in any tenement, rented by such person, unless such tenement shall consist of a house or building within such parish, being a separate and distinct dwelling-house, or building, or of land within the parish, or of both, boná fide hired by such person at £10 a-year at least, for the term of one whole year: nor unless such house or building shall be held, and such land occupied, and the rent actually paid for the same, for one whole year at least, by the person hiring the same; nor unless the whole of such land shall be situate in the same parish (or township) as the house wherein the party hiring the same dwells.

Of the Removal of the Poor Chargeable, or likely to become Chargeable.

By stat. 13 and 14 Car. II. c. 12, sect. 1, upon complaint by the churchwardens and overseers to one justice within forty days, of a person coming to reside on a tenement under £10 a year, any two justices of the division might, on his being likely to become chargeable to the parish, remove such person to the place of his last legal settlement. And, if such person refused to go, or returned back when sent, he might be committed to the house of correction as a vagabond; and, if the parish officers of his parish refused to receive him, they might be indicted for their default. This provision had long been considered as cruel and impolitic: see 1 Blackstone's Commentaries, c. 9, and the notes: and, by 35 Geo. III., c. 101, the first (and consequently the third) section of this statute is repealed; the reason assigned in the preamble of the 35 Geo. III. is, that 'many industrious poor persons chargeable to the parish, &c., where they live, merely from want of work there, would, in any other place where sufficient employment is to be had, maintain themselves and families without being burdensome to any parish; and that such poor persons are, for the most part, compelled to live in their own parish, and not permitted to inhabit elsewhere, under pretence that they are likely to become chargeable to the parish where they go for employment: although their labor might, in many instances, be very beneficial to such parish.' The statute enacts, 'That no poor person shall, in future, be removed, by virtue of any order of removal, from the parish or place where such poor person shall be inhabiting, to their last settlement, until such person shall have become actually chargeable to the parish or place in which they shall inhabit; when they may be removed by two justices; in the same manner, and subject to the same appeal, and with the same powers, as might have been formerly done with respect to persons likely to become chargeable.' This provision had been previously made as to members of Friendly Societies, by stat. 33 Geo. III., c. 54.

Persons convicted of larceny or other felony, rogues, vagabonds, idle and disorderly persons, and reputed thieves, and unmarried women with child, shall be considered as actually chargeable. Stat. 35 Geo. III., c. 101, sects. 5, 6. By the same statute justices are empowered to suspend the removal of sick persons; the charges incurred by such suspension to be borne by the parish to which they are removable. Sect. 2.—And any bastard, born during such suspension, on behalf of its mother, shall belong to the mother's settlement. Sect. 3.

By 52 Geo. III., c. 160, the settlement of paupers, being in gaol on mesne process, who may have relief ordered them under that act, shall be ascertained by one justice, who shall make an order of removal to the proper parish, but which order shall be suspended whilst the pauper debtor remains in prison, and the parish where the pauper is settled shall pay the expenses. By 54 Geo. III., c. 170, sect. 10, churchwardens and overseers, or others having the management of the poor, may employ any person to remove paupers, ordered by magistrates to be removed.

Persons who shall unlawfully return to the parish whence they are legally removed shall be deemed idle and disorderly persons, and may be committed to the house of correction for one month. Stat. 17 Geo. II. c. 5. See Vagrants. It seems that nearly all the determinations, as to orders for removal of persons likely to become chargeable, now apply, mutatis mutandis, as to the removal of those who are actually so.

The first step which the parish officers are to take, in order to procure the removal of a pauper chargeable to their parish, is to make a com

plaint to a justice of the peace, accompanied with a statement that the pauper had been examined: it need not, however, state that the examination was on oath; but ought to show that the pauper was summoned and heard; but even this is not, in all cases, absolutely necessary. The examination must be taken before two justices, and it must be by the same two justices who signed the order; and therefore an order stating it, in the alternative, to have been taken 'before us or one of us,' is bad. The two justices also must sign the order in the presence of each other; and the justices of one county cannot make an order of removal on an examination taken and transmitted to them by justices of another county, although such examination be verified by oath. An order signed by two justices separately, and in different counties, is not void, but only voidable on appeal.

The next proceeding is the adjudication; for an order of removal cannot be good if it omit to adjudge that the persons complained of actually became chargeable to the parish complaining, and that they are last legally settled in the parish to which they are intended to be removed. An order, removing nurse children to their derivative settlement, is good, without stating the death of the parent, or adjudging the place, to which they are removed, to be the settlement of their parents. The order must state that the justices are justices of the peace for, and not in, the county; but it need not state that they were of the division where the pauper lives; and it is enough to name the county in the margin of the order; for the margin of an order of removal is part of the order itself: if, however, two counties are named, and it state them to be justices of the counties aforesaid, it is bad.

That the poor laws, however benevolently designed or humanely administered, have been the source and support of many evils, to all classes of the community, has been but too well established: the poor's-rate in England has threatened in seasons of agricultural distress to absorb the rental of the country, while the once independent and industrious spirit of our poor has been in innumerable instances destroyed. 'The land must maintain us'—'We are not to starve'—'We are to live out of it as well as the rich'—'Is this enough for bread?'—are observations, which, however abstractedly true, the poor can only be taught to make by most unnatural circumstances. However difficult may be the remedy for some of these evils, that these laws press unequally, and therefore often most unfairly, on those who pay poor's rates, that they are clogged with most expensive proceedings which the most careful overseers cannot avoid sanctioning—we allude to the wretched state of the law of settlement, and its consequences—and that in effect they have to a large extent made the poor idle and careless, and the industrious poor, is not to be disputed.

Still we say, with an able legislator on the subject, we do not attribute these mischiefs, which have arisen mainly out of the 43d Elizabeth, to its inventors or the spirit in which it originated—quite the contrary: the support and maintenance of the old, lame, blind, or impotent is conformable to a duty of higher influence than human institutions. But the constraining and acting upon this law in an advanced and much altered state of society, and the collateral measures of those who have had to administer it, have evidently introduced much that is foreign to its intention. It was never designed to give a right of support and maintenance to those who, by the practice of frugality, sobriety and industry, might have supported themselves, but who have become chargeable by their crimes and misconduct. It never had in contemplation that men should *anticipate* parochial support as a source of maintenance for themselves and families,—nor did it intend to take away from the laboring classes *all* interest and concern in their own well-being. It did not contemplate the total destruction of independence, or that so large a proportion of the community should view the present moment as the sole object worthy of their attention. These are evils which have arisen out of the administration of that act. Whilst the country remained chiefly agricultural, the progress of this malady was slow. Since we have become a manufacturing people, its increase has been, out of all measure and calculation, rapid. In 1776 the amount of the poor-rates was £1,530,800. In forty-three years after they had augmented to 8,500,000! And each successive augmentation of the burden has been attended with a proportionable increase of misery. Pauperism contaminates all who come within its vortex—foreigners contemplate with astonishment the sums provided in Great Britain for the poor, which, with the addition of endowments to charities, exceed 9,000,000 annually, a revenue possessed by few sovereigns in Europe. And, dazzling as this appears at a distance, what are the effects when viewed more closely? Does it produce happiness, content, and gratitude, even among the objects relieved? Not a particle of gratitude, and certainly nothing of contentment, is to be found amongst the greater number—discontent, gloom, and misery, pervade all who are connected with it.

Such are the evils; the remedies we feel to be among the most difficult objects of future legislative provision. Mr. Curwen once, we believe about 1819, proposed a plan of general taxation on income, in fact an income or property tax, as a substitute for all poor's rates, and to be managed by the parochial officers. Mr. Scarlett has since most ably contended for an abolition of the whole of the laws of settlement, observing that the expenses of removing the poor became, in numerous instances, far greater than their maintenance for half their lives. In 1834 an important modification of the poor laws was effected, the operations of which are not yet so fully developed as to supersede the analysis of the poor laws here given. The chief feature in the new arrangement consists in the vesting of extensive powers in three commissioners.

POORBUNDER. A town and government on the south-west coast of the Gujrat Peninsula, containing extensive iron-works. On a high mountain in this district, visible from Bhattia,

once stood the city of Goomtee, which was the metropolis of the ranahs of Poorbunder, when their sway extended throughout the western quarters of the Gujrat peninsula. It was destroyed by Jam Bhamenee, the son of Jam Oner, who invaded the country from Sinde, for the purpose of overturning the government of Poorbunder. Legendary tales and songs state their passage of the Run at Mallia, which may be esteemed evidence of the extent of that curious swamp at an early period. In this district there are several extensive works for fusing iron.

By an agreement in 1808, with the Bombay government, Rana Sertanjee and Coer Hallajee of Poorbunder, engaged not to permit or connive at any act of piracy committed by any person under his authority; and also to abstain from plundering British vessels in distress. Reciprocal freedom of trade to be permitted by both parties, and an agent from the Bombay government to be allowed to reside at Poorbunder.

POOTELLAM, a town on the west coast of Ceylon, remarkable for its salt pans, formed by an arm of the sea. A large quantity of salt was manufactured here by the Dutch; but, since the British acquired Ceylon, this production has been almost entirely neglected.

POP', *n. s.*, *v. n.*, & *v. a.* } Fr. *paf*; Lat.
POP'-GUN, *n. s.* } *poppysma*. A small, smart, quick, sound or motion, formed from the sound, most probably: to move or enter quickly or suddenly; to put out or in suddenly; to shift: a pop-gun is a toy making a sudden, sharp, noise.

He that killed my king,
Popt in between the' election and my hopes.
Shakspeare.

That is my brother's plea,
The which if he can prove, he *pops* me out
At least from fair five hundred pounds a year. *Id.*

A boat was sunk and all the folk drowned, saving one only woman, that in her first *popping* up again, which most living things accustom, espied the boat risen likewise, and floating by her, got hold of the boat, and sat astride upon one of its sides. *Carew.*

He *popped* a paper into his hand. *Milton.*

The commonwealth *popped* up its head for the third time under Brutus and Cassius, and then sunk for ever. *Dryden.*

A fellow, finding somewhat prick him, *popt* his finger upon the place. *L'Estrange.*

If their curiosity leads them to ask what they should not know, it is better to tell them plainly, that it is a thing that belongs not to them to know, than to *pop* them off with a falsehood. *Locke.*

I have several ladies, who could not give a *pop* loud enough to be heard at the farther end of the room, who can now discharge a fan, that it shall make a report like a pocket pistol. *Addison.*

I startled at his *popping* upon me unexpectedly. *Id.*

Didst thou never *pop*
Thy head into a tinman's shop? *Prior.*

Life is not weak enough to be destroyed by this *pop-gun* artillery of tea and coffee. *Cheyne.*

As he scratched to fetch up thought,
Forth *popped* the sprite so thin.
Swift's Miscellanies.

Others have a trick of *popping* up and down every moment, from their paper to the audience, like an idle school-boy. *Swift.*

POPÆ, in Roman antiquity, persons who attended the sacrifices, provided the victims, knocked them down and killed them. They were half naked; their shoulders, arms, and upper parts of their bodies being uncovered as far as their navels, and the rest covered to the mid-leg with a linen apron, or the skins of the sacrifices. They wore crowns of laurel on their heads.

Illa dies hornis cædem denuntiat agnis,
Succinctique calent ad nova lucra popæ.
Propert. l. 4, eleg. 3, v. 61.

POPAYAN, a government of Columbia, in New Grenada, is bounded on the north by the Llanos de Nieva; on the west by Choco and the Pacific; on the east by the government of Quixos; and on the south by that of Atacames. It is subordinate to the presidency of Quito, and contains the several districts of Cali, Quatro Ciudades, Timana, Guadalaxara de Buga, San Sebastian de la Plata, Almaguer, Caloto, San Juan de Pasto, El Raposo, and Barbacoas. Of these Pasto is large and fertile; Cali and Buga, lying between Popayan and Choco, are thriving on account of the trade they mutually carry on; and Caloto is fertile and rich, though subject to earthquakes: none of these, however, deserve the name of provinces.

Popayan possesses, from the extent of its surface, a very unequal climate: the district of Barbacoas, being on the sea shore, is extremely hot, whilst in the interior, on the mountains, the cold is excessive; but the capital enjoys a temperate climate and eternal spring. Through the northern part of the government rises the central and highest branch of the three parallel chains of the Andes: its summits are above the lower limits of Congelation; of these Baranguan, Quindiu, and Guancas, are the most lofty. Tempests and earthquakes are more frequent in this government than in Quito itself.

The soil varies much. It produces grains and fruits in great abundance. Among the singular plants of the country is the coca, or betel, which is chewed by the natives in the same manner, and for the same purposes, that it is in the East Indies; and one of the gum-trees of Popayan yields a resin so remarkably tenacious that, when used to varnish ornamental work, it resists the application of boiling water, or even acids; for which reason, tables, cabinets, &c., made by the Indians, and lacquered with it, are highly valued at Quito.

Great numbers of horned cattle, horses, and sheep, are reared by the farmers. Popayan also carries on much trade, as all the European goods from Carthagena are consigned hither, and sent to Quito; it exports thither, also, cattle and mules, receiving cloths, &c., in return. Its active commerce embraces likewise dried beef, salt pork, rum, tobacco, lard, cotton, &c., which are sent to Choco and other places, in barter for the precious metals: sugar and snuff are imported from Santa Fé. The exchange of silver for gold is also a great branch of traffic. To go from Popayan to Santa Fé, the central Cordillera must be crossed; the pass most frequented is that of Guanacas in 2° 34′ N. lat., between Popayan and the small town of La Plata, pre-

senting every where to the view summits clothed in eternal snows. It is impossible to traverse this road without trembling; and care must be taken to encamp at night as near the top of the mountain as possible, or to stop at the village of Guanacas, on the eastern side; it being absolutely necessary to stop, if the blackness of the clouds indicates that bad weather is at hand. The mules which convey passengers, and which are made use of in preference to horses, for the secureness of their footsteps, not only partake the dangers, but run much greater risks than the traveller, as they have equally with their riders to resist the effects of the extreme cold, and to undergo the greater part of the fatigue. The whole road, for the space of two leagues, is so covered with the carcases and bones of animals which have sunk under their exertions, that it is impossible to avoid treading over them. On the south, at the distance of five or six leagues, this pass has the snowy mountain of Coconoco, an ancient volcano, which is not at present in activity, and on the north another summit called Houila, also covered with perpetual snow. Yet at the top of the gorge is a small lake or pond, of which the water never freezes; and at less than 700 feet distant from this on each side, are the sources of the Cauca and the Magdalena. Goods are often left in this place, because the muleteers will not run the risk of quitting it between suns. The distance from Popayan to La Plata (the chief town on the Magdalen where the journey terminates), is about nineteen or twenty leagues, which generally occupies twenty or twenty-two days to travel; but the time taken to pass the actual ridge is about a day, and there are habitations at intervals.

This is not the case with the other road, which leads from Popayan by the mountains of Quindiu, between the cities or rather towns of Ibague and Carthago, in 4° 36′ N. lat. It is the most difficult to scale, when taken in the sense of a road, of any in the whole Cordillera, crossing a thick forest, which, in the most favorable weather, is not passable under ten or twelve days. No hut is to be seen, or any means of human subsistence; and the venturous traveller must take with him at least a month's provisions, as the sudden thaws and swellings of rivers often render it equally impracticable to return or go forward.

The highest point of this pass, styled Garito de Paramo, is 11,499 feet above the level of the sea. The path is not more than a foot and a half broad, and has in several points the appearance of a gallery, whose surface has been taken off; the whole is bottomed with muddy clay. The torrents which rush down the rocks form occasional narrow beds, from twenty to twenty-five feet in depth, along which the passenger must work his way in the mud, encompassed by a wall of rocks covered with vegetation of luxuriant growth, which renders them nearly dark. Along these galleries, many of which are a mile and a half in length, the oxen employed to carry baggage (and whose feet are better adapted than those of mules for struggling through the tough clay), can hardly force their way. The meeting with other travellers in such a situation is highly troublesome, as there is the greatest difficulty to pass. The roots of the bamboos, studded with strong prickles, projecting from the sides of the mountains, are among the other inconveniences, combined with the necessity of crossing the icy waters of the torrents, and of being deluged with the incessant rains which prevail. Colonists, whose affairs oblige them to go by this route, are carried in chairs on men's backs by a set of people, generally either Creoles or Mulattoes, who are bred to this business. The common price of carriage from Ibague to Carthago, occupying about fifteen or twenty days, is from fifty to sixty shillings. Beside the capital, Cali, Carthago, Ibogue, Perace, La Plata, Timana, Neyva, Mercaderc, and St. Juan de Pasto, are places of consideration.

Popayan, the capital of the above government, is situated in the beautiful valley of the Cauca River, in 2° 28′ 38″ N. lat., and 76° 31′ 30″ W. long., 195 miles S.S.W. of Santa Fé. It is 5905 feet above the level of the sea, having an uninterrupted prospect to the north, and a mountain named M, from its resemblance to that letter, on the east. On the summit of M is a convent, near which issues the Molena River, that runs rapidly through the city, and has two bridges, one of stone and the other of wood, erected over it. The Cauca flows about a league from Popayan, with a broad and quick current, subject to dreadful inundations from June to August, when the torrents descend from Guanacas and the neighbouring mountains; in the immediate vicinity are the great volcanoes of Puracé and Sotara.

The streets of this city are broad, straight, and level, the town being built in a rectangular shape. The houses have mostly only a ground floor, and, though made of unburnt brick, are often handsome. There is a cathedral, several convents and churches, and two nunneries. It is also the seat of the mint, the annual coinage of which is estimated at a million of dollars. Most of the people are of the Mulatto cast, owing to the great number of Negroes who have always been employed here and in the mines. The inhabitants have been computed at above 25,000, containing many very wealthy persons, who have accumulated their fortunes by trade.

POPE, *n. s.*, Pope'dom, Po'pery, Po'pish, *adj.* Po'pishly, *adv.* Span., Port., Ital., and Lat. *papa*; Gr. πάππας. The bishop of Rome: popedom is the state or dignity of the pope: popery, the religion of the church of Rome: popish is, taught by the church of Rome; tinctured with popery.

In this sense, as they affirm, so we deny, that whatsoever is *popish* we ought to abrogate. *Hooker.*

I refuse you for my judge; and
Appeal unto the *pope* to be adjudged by him.
Shakspeare.

That world of wealth I've drawn together
For mine own ends; indeed, to gain the *popedom.*
Id.

I know thou art religious,
With twenty *popish* tricks and ceremonies. *Id.*

He was organist in the *pope's* chapel at Rome.
Peacham.

Christianity has been more oppressed by those that thus fought for it, than those that were in arms against it; upon this score, the *pope* has done her more harm than the Turk. *Decay of Piety.*

She baffled the many attempts of her enemies, and entirely broke the whole force of that party among her subjects, which was *popishly* affected.

Addison's Freeholder.

A friend in Ireland, *popishly* speaking, I believe constantly well disposed towards me.

Pope to Swift.

Popery, for corruptions in doctrine and discipline, I look upon to be the most absurd system of Christianity. *Swift.*

The poor are near at hand, the charge is small,
A slight gratuity atones for all.
For though the *pope* has lost his interest here,
And pardons are not sold as once they were,
No papist more desirous to compound,
Than some grave sinners upon English ground.

Cowper.

POPE. In the east this appellation is frequently given to Christian ministers in general, and in the west bishops were so called in ancient times; for many centuries, however, it has been exclusively appropriated to the bishop of Rome, whom the Roman Catholics look upon as the common father of all Christians. The Roman or Latin church is certainly a system of government whose jurisdiction extends to a great part of the known world, though its authority has been circumscribed within narrower limits since the revolution in the sixteenth century, that, in many places, delivered Christianity from the bondage of superstition. This system of ecclesiastical policy, extensive as it is, is under the direction of the bishop of Rome alone, who, by virtue of a presumed hereditary succession, claims the authority, prerogatives, and rights of St. Peter, the supposed prince of the Apostles, as the supreme head of the universal church. He is called the holy pontiff, or pope,—a name assumed in the twelfth century.

In the first ages of the church, the people and the priests, and sometimes only the priests, elected the pope, according to the plurality of voices. The emperors afterwards claimed the right of confirming the election. In the eighth century pope Adrian I., in a council of bishops assembled at Rome, conferred upon Charlemagne and his successors the right of election; and they reserved to themselves the privilege of approving the person that was elected by the priests and people; nor was the consecration of the elected pontiff valid, unless performed in the presence of the emperor's ambassadors. The election, however, after undergoing many revolutions as to the form of it, is now referred to the cardinals in conclave.

The person of the pope may be considered in two very different capacities, as temporal sovereign of the Roman territory, and as chief pastor of the Catholic church. To give the reader a clear and precise idea of the rights which every Catholic considers as inherent in the successor of St. Peter as a spiritual character, it will be necessary to observe that the pope as bishop of Rome, metropolitan and primate of Italy, and patriarch of the west, enjoys the same privileges and authority as are enjoyed by other bishops, metropolitans, primates, and patriarchs within their respective dioceses and districts; that his authority, like theirs, is confined within certain limits marked out by ancient custom, and by the canons; and that, like theirs also, it may be modified or suspended by the church at large. As patriarch of the west, the pope enjoys a pre-eminence elevated enough to satisfy the wishes of the most ambitious prelate, as by it he ranks before all western ecclesiastics, and takes place and precedency on all public occasions. But the Roman pontiff claims honors still more distinguished, and as successor of St. Peter is acknowledged by the Catholic church to sit as its first pastor by divine institution. It is maintained that the pope enjoys, by the institution of Christ, the primacy of honor and jurisdiction over the whole Christian church, and to refuse it to him would be deemed an act of rebellion. But no authority has yet determined, and it seems indeed very difficult to fix, the precise rights and prerogatives which are conferred by this primacy, and which are so inseparably annexed to it that to oppose their exercise, or deny their existence, would be either schism or heresy. The Jesuits have, however, ever maintained that the pope is infallible; that he is the only visible source of that universal and unlimited power which Christ has granted to his church; that he is not bound by any laws of the church, nor by any decrees of the councils that compose it; and that he alone is the supreme lawgiver of that sacred community—a lawgiver whose edicts and commands it is in the highest degree criminal to oppose or disobey. According to the canons the pope was as far above all kings as the sun is greater than the moon. He was king of kings, and lord of lords, though he subscribed himself the servant of servants. The immediate and sole rule of the whole world belonged to him by natural, moral, and divine right; all authority depending upon him. All nations and kingdoms were under the pope's jurisdiction, for to him God had delivered over the power and dominion in heaven and earth.

But though no temporal advantages were originally, or by its institution, annexed to the papal office, yet we find that even in the very commencement of Christianity the bishop of Rome had become a conspicuous personage so far as to attract the attention of the emperors, and sometimes to awaken their jealousy. When the emperors embraced Christianity it may easily be imagined that the successor of St. Peter (if such he were) acquired an increase of temporal weight and dignity; and it has been observed that the Pagan historians speak with some asperity of the splendor of his revenue and the delicacy of his table. But, besides the consideration inseparable from the office itself, another source of temporal greatness may be found in the extensive possessions of land, and in the great riches, in plate, of the Roman church itself. These riches considerable, even under the Pagan emperors and during the persecutions, were not a little increased by the liberal donations of the Christian princes, and particularly of Constantine the Great. As early as the fifth century the popes aimed at a supremacy of ecclesiastical jurisdiction, which was confirmed to them by the tyrant Phocas in the seventh. By the donation of the exarchate of Ravenna, and of Pentapolis, to the Roman pontiff, Pepin raised the bishop of Rome to the rank of a temporal prince: but it was not until the time of Leo IX. that they

carried their pretensions so far as to assume the high title of lords of the universe, arbiters of the fate of kingdoms and empires, and supreme rulers over the kings and princes of the world; arrogating the power of transferring territories and provinces from their lawful possessors to new masters.

Though the pope is both bishop and prince, yet his titles, dress, equipage, and the whole ceremonial of his court, are adapted to the first of these characters. He is styled holiness, the holy father, and sometimes in history the sovereign pontiff; but the former appellations, as more appropriate to his duties and functions, are exclusively used in his own court. His robes are the same as those of a bishop in pontificals, excepting the stole and the color, which is white, not purple. His vestments, when he officiates in church, as well as his mitre, do not differ from those of other prelates. The tiara seems originally to have been an ordinary mitre, such as is still worn by the Greek patriarchs. The three circlets, which have raised it into a triple crown, were added at different periods, and it is said for different mystic reasons. The first or lowest seems to have been originally a mere border, gradually enriched with gold and diamonds. The second was the invention of Boniface VIII. about the year 1300; and to complete the mysterious decoration the third was superadded about the middle of the fourteenth century. The use of the tiara is confined to certain extraordinary occasions, as in most great ceremonies the pope uses the common episcopal mitre. Whenever he appears in public, or is approached, even in private, he is treated with great reverence. In public, a large silver cross, raised on high, is carried before him as a sacred banner, the church bells ring as he passes, and all kneel in his sight. When he officiates at the patriarchal basilicæ he is carried from his apartments in the adjoining palace to the church in a chair of state; though in the chancel his throne is merely an ancient episcopal chair, raised only a few steps above the seats of the cardinals or clergy. In private, as the pontifical palaces are vast and magnificent, there are perhaps more apartments to be traversed, and greater appearances of splendor in the approach to his person, than in an introduction to any other sovereign. In his antichamber a prelate in full robes is always in waiting; and when the bell rings the door of the pontifical apartment opens, and the pope is seen in a chair of state with a little table before him. The person presented kneels once at the threshold, again in the middle of the room, and lastly at the feet of the pontiff, who, according to circumstances, allows him to kiss the cross embroidered on his shoes, or presents his hands to raise him. The pontiff then converses with him a short time, and dismisses him with some slight present of beads, or medals, as a memorial. The ceremony of genuflection is again repeated, and the doors close.

The pope has no hours of relaxation, always encumbered with the same robes, surrounded by the same attendants, and confined within the magic circle of etiquette. A morning of business and application closes with a solitary meal; a walk in the gardens of the quirinal or vatican, a visit to a church or an hospital, are his only exercises. The pope never dines in company; so that to him a repast is no recreation; it is consequently short and frugal. Sixtus Quintus is reported to have confined the expenses of his table to about sixpence. Innocent XI. did not exceed half a crown; and the late pontiff, considering the different valuation of money, equalled them both in frugality, as the expenses of his table never exceeded five shillings a day. On the whole the person and conduct of the pope, whether in public or in private, are under perpetual restraint and inspection. The least deviation from strict propriety, or even from customary forms, would be immediately noticed, published, and censured in pasquinades. Leo X. loved shooting, and by the change of dress necessary for that amusement gave scandal. Clement XIV. (Ganganelli) was advised by his physicians to ride; he rode in the neighbourhood of his Alban Villa, and offended, it is said the people of the country not a little by that supposed levity. Benedict XIV. wished to see the interior arrangement of a new theatre, and visited it before it was open to the public; the next morning an inscription appeared over the door by which he had entered, 'Porta santa; plenary indulgence to all who enter.' These anecdotes suffice to show the joyless uniformity of the papal court, as well as the strict decorum that pervades every department immediately connected with the person of the pontiff.

To speak of the prerogative of the pontiff as a sovereign is scarcely necessary, as it is known to be uncontrolled by legal or constitutional authority: if ever any monarch had either an opportunity or an inducement to realize the generous plan formed by Servius Tullus, of giving liberty and a constitution to his people, the popes, we should imagine, could have wanted neither. But the doctrine of the infallibility of the popes must not pass unnoticed. On this subject we will give our readers the testimony of Mr. Eustace, at the same time apprising them that, though the statements are essentially true, they are colored by the partiality of Roman prejudice. 'The truth is,' says our author, 'that there is no such article as the infallibility of the pope in the Catholic creed; for, according to it, infallibility is ascribed not to any individual or even to any national church, but to the whole body of the church extended over the universe. That several theologians, particularly Italian and Spanish, have exaggerated the power and the privileges of the pope, is admitted; and it is well known that among these, some, or rather several, carried their own opinion of pontifical prerogative so high as to maintain that the pontiff, when deciding ex cathedrâ, or officially, and in capacity of first pastor and teacher of the church, with all the forms and circumstances that ought to accompany legal decisions, such as freedom, deliberation, consultation, &c., was, by the special protection of providence, secured from error. The Roman court favored a doctrine so conformable to its general feeling, and of course encouraged propagation; hence, were we only to judge of the power of the pope by his own pretensions, we should find it unlimited and supreme; for there

are no prerogatives that can flatter ambition which he does not claim for himself and his court. He not only pretends that the whole power and majesty of the church reside in his person, and are transmitted, in certain portions, from him to the inferior bishops; but, moreover, has frequently and distinctly asserted the absolute infallibility of all decisions and decrees that proceed from his tribunal; though he never pretended to enforce it *as an article of Catholic faith*, or ventured to attach any marks of censure to the contrary opinion. This latter opinion, the ancient and unadulterated doctrine of the Catholic church, prevailed over Germany, the Austrian empire, Poland, the Low Countries, and England; and in France was supported by the authority of the whole Gallican church, and by the uanimous declaration of all the universities. So rigorously indeed was their hostility to papal infallibility enforced, that no theologian was admitted to degrees unless he maintained in a public act the four famous resolutions of the Gallican church against the exaggerated doctrines of some Italian divines relative to the power of the Roman see. These resolutions declare that the pope, though superior to each bishop individually, is yet inferior to the body of bishops assembled in council; that his decisions are liable to error, and can only command our assent when confirmed by the authority of the church at large; that his power is purely spiritual, and extends neither directly nor indirectly to the temporalities or prerogatives of kings and princes; and, in fine, that his authority is not absolute or despotic, but confined within the bounds prescribed by the canons and the customs of the church. This doctrine was taught in all the theological schools, that is, in all the universities and seminaries of France, as well as in all the abbies; and was publicly maintained by the English Benedictine College at Douay. The conclusion to be drawn from these observations is, that no Catholic divine, however attached to papal prerogative, ever conceived an idea so absurd as that of ascribing infallibility to the person of the pontiff; and secondly, that those theologians who ascribed infallibility to papal decisions when clothed with certain forms, gave it as their opinion only, but never presumed to enforce it as the doctrine of the Catholic church.'

The pope is elected by the college of cardinals, being seventy-two in number, including the six suburban bishoprics; whose principal and most honorable privilege is that of electing the pope; and it is easy to conceive that their dignity and importance increased with that of the Roman see itself; and that they shared alike its temporal and its spiritual pre-eminence. As the cardinals are the counsellors, so they are the officers of the pontiff, and are thus entrusted with the management of the church at large, and of the Roman state in particular. The grand assembly of the cardinals is called the consistory, where the pontiff presides in person. Here they appear in all the splendor of the purple, and form a most majestic senate. Here, therefore, public communications are announced, foreign ambassadors received, cardinals created, formal compliments made and answered; in short, all the exterior splendor of sovereignty is displayed. But the principal prerogative of a cardinal is exercised in the conclave, so called because the members of the sacred college are then confined within the precincts of the great halls of the Vatican palace, where they remain immured till they agree in the election of a pontiff. As soon as the holy father has expired, the cardinal chamberlain, in a purple dress, presents himself at the door of his chamber and knocks three times with a gold hammer, calling each time the pope by his christian, family, and papal names. After a short time he says, in presence of the clerks of the chamber and his apostolical votaries, who take act of that ceremony, 'He is then dead.' The fisherman's ring is then brought to the cardinal who breaks it with the same hammer. He then takes possession of the vatican in the name of the apostolical chamber. After having established his authority in that palace, he sends guards to take possession of the gates of the city and of the castle of St. Angelo; and, when he has provided for the safety of Rome, he quits the vatican in a carriage, preceded by a captain of the pope's guard, and having by his side the Swiss who generally accompany his holiness. When this march begins, the great bell of the capital is tolled, and, as it only tolls on this occasion, announces to the whole city the death of the sovereign pontiff. The body having been embalmed is clad in its pontifical dress, and with the mitre on its head, lies in state during three days on a bed of parade. It is next carried with great pomp to the church of St. Peter, where it remains nine days exposed to public view, after which the burial takes place. The next day the cardinals assemble in the same cathedral, where the oldest of them celebrates the mass of the Holy Ghost for the election of a new pope. Another prelate, in a Latin oration, exhorts the cardinals to choose an individual worthy of so eminent a station; after which they all march in procession behind the papal cross, the musicians singing the hymn Veni Creator! to the hall of conclave, which occupies a large portion of the vatican. The large rooms are divided by temporary partitions into what are called cells, which are subdivided again into little rooms and closets. Every cardinal has his own, for him and his assistants, and it is only large enough to hold a bed, five or six chairs, and a table. The hour of holding the conclave being come, a bell is rung to cause the ambassadors, princes, prelates and other persons of distinction who may be present, to retire. When they are all gone out, the doors and windows are walled up, with the exception of one, which throws but a dim light upon the conclave. The only communication with the exterior is by the means of towers, in the same shape as those used in convents of nuns. One door is also kept for the removal of any cardinal who may be ill, but who loses the right of giving an active vote if he retires. The mode of election now in use is by a secret ballot. Two chalices stand on a long table in the chapel of Sixtus, into which the cardinals deposit their bulletins, containing the name of the individual for whom they vote. One of the scrutators reads it aloud, while two others mark the number of votes for

each individual, by the side of his name, on the large tablet where all those of the cardinals are inscribed. Whoever obtains two-thirds of the votes present is canonically elected. His name is immediately proclaimed aloud, and the cardinals sitting on his right and left rise and quit their places. His consent is asked; and, when it is given, the cardinals, beginning by the oldest, perform the first adoration; that is to say, kiss his foot, and then his hand. The first cardinal deacon now announces the election to the people, and the artillery of the castle of St. Angelo and the bells of the city spread the news afar. The people are then allowed to break into the conclave and to carry off all they can.

No person is eligible to the papacy under fifty-five years of age, or that is not an Italian by birth, having already obtained a place in the college of cardinals; or who is a prince by birth, or allied to a reigning house, lest such a pope should dismember the patrimony of St. Peter, or 'abandon that neutrality which a common father should observe towards all Christian princes;' or, finally, should treat the cardinals with too much hauteur: thirdly, no one promoted to the degree of cardinal at the nomination of some crown, especially that of France and Spain, or being a natural-born subject of either of these powers, lest gratitude or national attachment should render him too devoted to the interests of the one or the other, is eligible. Even youth, and a good complexion and figure, are considered as obstacles. But all these maxims and rules vary and change according to the inconstant and precarious impulse of policy and faction. Hence it often happens that, in the numerous college of cardinals, a very small number are permitted, upon a vacancy, to aspire at the papacy, the greatest part being generally prevented by their birth, their character, their circumstances, and by the force of political intrigues, from flattering themselves with the pleasing hope of ascending that towering summit of ecclesiastical power and dominion. 'It is not my intention,' says Mr. Eustace, 'to specify all the forms of etiquette observed, or the ceremonies practised during the process, or at the conclusion of the election; two or three things, however, I must notice, for reasons which will appear sufficiently obvious: one is the custom of putting the tickets containing the votes of the cardinals on the patina, or communion plate, and then into the chalice: now however important these votes may be, and however intimate their connexion with the welfare of the church, yet to apply to them the vases devoted in a peculiar manner to the most awful institutions of religion seems to pass beyond disrespect, and almost to border on profanation. The next ceremony to which I have alluded is that called the adoration of the pope; it takes place almost immediately after his election, when he is placed in a chair on the altar of the Sixtine chapel, and there receives the homage of the cardinals: this ceremony is again repeated on the high altar of St. Peter's. Now, in this piece of pageantry, I object not to the word adoration; no one who knows Latin, or reflects upon the sense which it bears on this and on a thousand other occasions, will cavil at it, though he may wish it otherwise applied. Nor do I find fault with the throne; he who is at the same time both pontiff and prince has from time and custom, perhaps, a double title to such a distinction. But why should the altar be made his footstool? the altar, the beauty of holiness, the throne of the victim lamb, the mercy-seat of the temple of Christianity: why should the altar be converted into the footstool of a mortal?'

The income of the Roman court is not only reduced in its amount, but is very irregular and uncertain. Several years ago, when in full possession of its territory, both in Italy and in France, it was not calculated at more than £600,000. 'Contrary to a very general opinion, I must here observe,' says Mr. Eustace, 'that this income arose principally from internal taxation, and that a very small part of it was derived from Catholic countries. The sums remitted by Catholic countries may be comprised under the two heads of annats and of dispensations: now these two heads, when united, did not produce in France, the richest and most extensive of Catholic countries previous to the revolution, more than £15,000 per annum. In Spain the annats had been abolished, or rather bought off; and in Germany, if I mistake not, suppressed. Dispensations, that is, licenses to take orders, to hold livings, to contract marriages, and do various acts, in cases and circumstances contrary to the prescriptions of the common canon law, produced merely sufficient to pay the expenses of the courts through which they necessarily passed, and added little to the papal revenue. As for the concourse of pilgrims, which was supposed to be so very productive a source of income, it brought nothing to Rome but the filth and the beggary of Catholic Europe. The far greater part of these pilgrims were not only too poor to bring an accession of wealth to the city, but even to support themselves, and were generally fed and lodged in hospitals expressly endowed for their reception. Into these hospitals 700 or more have frequently been admitted at a time, and supplied, not only with the necessaries, but even with the comforts of life.' The revolutionary invasion of Italy, and the consequent dismemberment of part of the Roman territory, lessened the papal income, not only by diminishing the number of persons who contributed to it, but by impoverishing all the inhabitants of the Roman state.

The propagation of Christianity being their first and most indispensable duty, the popes have applied themselves to it with zeal and success, not only in the early ages, when their spiritual functions were their chief occupation, but even at a later period, when politics and ambition had engrossed no small portion of their attention. To support this grand and extensive plan of Christian conquest, there are several establishments at Rome, and one in particular which from its object is called the Collegium de Propaganda Fide. This seminary is vast and noble, supplied with a magnificent library, and with a press, in which books are printed in every known language. The same treasury has to keep all the public edifices in repair, especially those immense palaces which, though of little use as re-

sidences, are the receptacles of all the wonders of ancient and modern art; to protect the remains of Roman magnificence from further dilapidation; and, in fine, to continue the embellishment and amelioration of the capital, and of its territory generally. When, to these burdens, we add the pensions which the pope is accustomed to settle on bishops when unusually poor and distressed, and the numberless claims upon his charity from every part of the world, we shall not be surprised either at the expenditure of an income not very considerable, or at the difficulties under which the papal treasury has frequently labored.

POPE, *n. s.* A small fish.

A *pope*, by some called a ruffe, is much like a pearch for shape, but will not grow bigger than a gudgeon: an excellent fish, of a pleasant taste, and spawns in April. *Walton.*

POPE, in ichthyology. See PERCA.

POPE (Alexander), a celebrated English poet, descended from a respectable family, and born the 8th of June, 1688, in London. His father being of the Romish religion, he was placed, at eight years of age, under the tutorship of Taverner, a priest, who taught him the rudiments of Latin and Greek; and soon after he was sent to a Popish seminary at Winchester, whence he was removed to a school at Hyde Park corner. He discovered early an inclination to poetry; and Ogilby's Virgil and Sandys's Ovid were his favorite books. At twelve he retired with his parents to Binfield, in Windsor Forest; where he studied Spenser, Waller, and Dryden. At fifteen, to a proficiency in Latin and Greek, he added a knowledge of the French and Italian languages. His pastorals, begun in 1704, first introduced him to the wits of the time; among whom were Wycherly and Walsh. The same year he wrote the first part of his Windsor Forest, though the whole was not published till 1710. In 1708 he wrote the Essay on Criticism, justly esteemed a masterpiece, though he was not then twenty years old. The Rape of the Lock was first published in 1712; in which, above all his works, his strength of imagination seems most conspicuous. In 1713 he circulated proposals for publishing a translation of Homer's Iliad, by subscription: by which he acquired a considerable sum of money. The subscription amounted to £6000, besides £1200, which Lintot the bookseller gave him for the copy. Our poet's finances being now in good condition, he purchased a house at Twickenham, whither he removed with his father and mother in 1715: the former died here about two years after. In 1717 Pope published a collection of all he had printed separately; and proceeded to give a new edition of Shakspeare; which being announced, in 1721, discovered that he had consulted his fortune more than his fame in that undertaking. The Iliad being finished, he engaged, upon the like footing, to undertake the Odyssey. Broome and Fenton contributed parts of it, and received £500 from him for their labors. It was published in the same manner, and on the same conditions as the Iliad, excepting that Lintot, instead of £1200, gave but £600 for the copy. This work being finished in 1725, he was afterwards employed with Swift and Arbuthnot in printing some volumes of Miscellanies. About this time he narrowly escaped losing his life, as he was returning home in a friend's chariot; which, on passing a bridge, happened to be overturned, and thrown with him and the horses into the river. A fragment of the glass cut him so desperately that he ever after lost the use of two of his fingers. In 1727 his Dunciad appeared in Ireland; and in 1728 in England, with notes by Swift, under the name of Scriblerus. It is a piece of the most perfect satire that ever was written. The work was presented to the king and queen by Sir Robert Walpole; who, about this time, offered Pope a pension, which however he refused, as he had formerly done a proposal of the same kind made him by lord Halifax. He greatly cultivated the spirit of independence; and—

'Unplac'd, unpension'd, no man's heir or slave,'

was frequently his boast. In 1729, by the advice of lord Bolingbroke, he wrote his Essay on Man. This was followed by his Ethic Epistles; the fourth of which, upon Taste, giving great offence, he next commenced his Satires, which he continued till 1739; and in which he attacked persons of the highest rank. His Essay on Man being translated into French in 1738, his system of Ethics was censured by professor Crousaz, but defended by Warburton, afterwards bishop of Gloucester. In 1742 he added a fourth book to the Dunciad. A genuine collection of his letters was published in 1737. He had all his life been subject to the head-ach, which he derived from his mother; and it was now greatly increased by a dropsy in his breast, under which he expired the 30th of May, 1744, in the fifty-sixth year of his age. He left Miss Blount his heir, a lady to whom he was long devoted; and to Warburton the property of his works; who accordingly gave a complete edition of them in 1751, in 9 vols. 8vo. Readers who wish to know more of this eminent poet may consult Warton's Essays on the Writings and Genius of Pope. Lord Orrery says of him, with no small degree of flattery, 'His chief aim was to be esteemed a man of virtue. His manners were delicate, easy, and engaging; and he treated his friends with a politeness that charmed, and a generosity that was much to his honor.' Dr. Johnson accuses him of parsimony. By natural deformity, or accidental misfortune, his life was a long disease, from which arose many of his peculiarities. See Johnson's Lives of the Poets.

POPE (Sir Thomas), an eminent English statesman of the sixteenth century, born in 1508. He was a man of letters, and the founder of Trinity College, Oxford. He died in 1588, and left behind him a fine library.

POPHAM (Sir John), lord chief justice of the common pleas in the reign of queen Elizabeth, was the eldest son of Edward Popham, Esq., of Huntworth in Somersetshire, and born in 1531. He was some time a student of Baliol College in Oxford. After quitting the university he fixed in the Middle Temple; and in 1568 became summer or autumn reader. He was soon after made serjeant at law, and in 1579 solicitor-general. In 1581 he was appointed

attorney-general, and treasurer of the Middle Temple. In 1592 he was made lord chief justice of the king's bench, and was knighted. In 1601 his lordship was one of the council detained by the unfortunate earl of Essex, when he formed the ridiculous project of defending himself in his house; and, on the earl's trial, he gave evidence against him. He died in 1607, aged seventy-six; and was buried at Wellington in Somersetshire, where he generally resided. He was thought somewhat severe in the execution of the law against capital offenders; but his severity had the happy effect of reducing the number of highway robberies. He wrote, 1. Reports and cases adjudged in the time of queen Elizabeth. 2. Resolutions and judgments upon cases and matters agitated in all the courts at Westminster in the end of queen Elizabeth's reign.

POPHAM (Sir Home Riggs), a naval officer, and knight commander of the Bath, born in Ireland in 1762, was a lieutenant in the American war. At the peace he employed himself in commercial pursuits in the East Indies, and, while commanding a country ship, discovered a passage for navigation at Pulo Penang. In 1794 he returned to the king's service, and, being useful to the duke of York in Holland, was appointed master, commander, and soon after post-captain. He was then employed in the Baltic, and in 1800 in the East Indies. In 1803 he entered the Red Sea, and settled advantageous terms of commerce for the English merchants: but, on his return home, his conduct was attacked in the house of commons. He was afterwards engaged in the expedition against Buenos Ayres, brought for it to a court martial, and sentenced to be reprimanded. He finally obtained the situation of commander-in-chief on the Jamaica station; but died in England at Cheltenham, September 13th 1820. He published A Statement of his Treatment since his return from the Red Sea; and A Description of the Prince of Wales's Island.

POP'INJAY, *n. s.* Belg. *papegay*; Ital. *papagallo;* Span. *papagayo.* A parrot; a woodpecker; a fop.

I, all smarting with my wounds, being galled
To be so pestered by a *popinjay*,
Answered neglectingly, I know not what.
Shakspeare.

Terpsichore would be expressed, upon her head a coronet of those green feathers of the *popinjay*, in token of that victory which the muses got of the daughters of Pierius, who were turned into *popinjays* or woodpeckers. *Peacham.*

Young *popinjays* learn quickly to speak. *Ascham.*

The great red and blue parrot; there are of these greater, the middlemost called *popinjays*, and the lesser called parroquets. *Grew.*

POP'LAR, *n. s.* Fr. *peuplier;* Lat. *populus.* A tree.

Po is drawn with the face of an ox, with a garland of *poplar* upon his head. *Peacham.*

All he described was present to their eyes,
And as he raised his verse the *poplars* seemed to rise.
Roscommon.

So falls a *poplar* that in wat'ry ground
Raised high the head. *Pope's Iliad.*

The leaves of the *poplar* are broad, and for the most part angular: the male trees produce amentaceous flowers, which have many little leaves and apices, but are barren: the female trees produce membraneous pods, which open into two parts, containing many seeds, which have a large quantity of down adhering to them, and are collected into spikes. *Miller.*

POPLAR, in botany. See POPULUS.

POPLAR, a populous and important parish in Ossulton hundred, Middlesex, formerly a hamlet and chapelry in the parish of Stepney, two miles and a half east from London. This parish has, within a few years, been most extensively improved, and is lighted with gas. Its name is derived from the great number of poplars which formerly grew here. That part next the river called Poplar, or Stepney-Marsh, on the Isle of Dogs, is the richest piece of marsh land in England; it is neither an island nor a peninsula, but a head of land formed by the serpentine course of the river Thames. The East India Company have here a hospital for the reception of the widows of inferior officers and seamen; the same company having given the ground for erecting the church, and been at the greater part of the expense in rebuilding it.

POPLITÆUS, in anatomy, a small muscle obliquely pyramidal, situated under the ham. See ANATOMY.

POPO, an island or cluster of isles in the Eastern Seas, the largest of which is about fifty miles in circumference. They are distant five leagues from the Bo Islands. They are inhabited, and afford nuts and dried fish. Long. 130° 0′ 15″ E., lat. 19° 14′ S. This is also the name of a small district on the Slave Coast of Africa.

POP'PY, *n. s.* Sax. popiᵹ; Latin, *papaver.* A flower.

His temples last with *poppies* were o'erspread,
That nodding seemed to consecrate his head.
Dryden.

Dr. Lister has been guilty of mistake, in the reflections he makes on what he calls the sleeping Cupid with *poppy* in his hands. *Addison.*

Of these are eighteen species; some sorts are cultivated for medicinal use; and some suppose it to be the plant whence opium is produced. *Miller.*

And pale Nymphæa with her clay-cold breath;
And *poppies*, which suborn the sleep of death.
Harte.

POPPY, SPATTLING, a species of cucubalus.

POP'ULACE, or
POP'ULACY, *n. s.*
POP'ULAR, *adj.*
POP'ULARLY, *adv.*
POPULAR'ITY, *n. s.*
POP'ULATE, *v. n.*
POPULA'TION, *n. s.*
POPULOS'ITY,
POP'ULOUS, *adj.*
POP'ULOUSLY, *adv.*
POP'ULOUSNESS, *n. s.*

Fr. *populace;* Lat *populus.* The multitude; the common people; the vulgar: popular is pleasing to, or espoused by, the people at large; familiar; vulgar; plebeian; studious of the people's favor: popularity, state of enjoying the people's favor; graciousness of behaviour; whatever moves or conciliates the people: to populate is to produce people: population, the state of a nation or people with regard to numbers: populosity and populousness, the state of abounding with people: populous, full of people; thickly inhabited; the adverb corresponding.

Homilies are plain and *popular* instructions. *Hooker.*

A wilderness is *populous* enough,
So Suffolk had thy heavenly company. *Shakspeare.*

The best temper of minds desireth good name and true honour; the lighter, *popularity* and applause; the more depraved, subjection and tyranny. *Bacon.*

The persuader's labour is to make things appear good or evil, which as it may be performed by solid reasons, so it may be represented also by colours, *popularities*, and circumstances, which sway the ordinary judgment. *Id.*

When there be great shoals of people, which go on to *populate*, without foreseeing means of life and sustentation, it is of necessity, that once in an age, they discharge a portion of their people upon other nations. *Bacon's Essays.*

The *population* of a kingdom does not exceed the stock of the kingdom, which should maintain them; neither is the *population* to be reckoned only by numbers; for a smaller number, that spend more and earn less, do wear out an estate sooner than a greater number, that live lower and gather more. *Bacon.*

When he thinks one monarch's lust too mild a regimen, he can let in the whole *populacy* of sin upon the soul. *Decay of Piety.*

Under colours of piety ambitious policies march, not only with security, but applause, as to the *populacy*. *King Charles.*

I was sorry to hear with what partiality and *popular* heat elections were carried in many places. *Id.*

Such as were *popular*,
And well-deserving, were advanced by grace. *Daniel.*

The emmet joined in her *popular* tribes
Of commonalty. *Milton.*

Far the greater part have kept
Their station; heaven, yet *populous*, retains
Number sufficient to possess her realms. *Id.*

Nor can we excuse the duty of our knowledge, if we only bestow those commendatory concerns which *popularity* set forth the eminency thereof. *Browne's Vulgar Errours.*

How it conduceth unto *populosity*, we shall make but little doubt; there are causes of numerosity in any species. *Browne.*

The old general was set aside, and prince Rupert put into the command, which was no *popular* change. *Clarendon.*

This will be allowed by any that considers the vastness, the opulence, the *populousness* of this region, with the ease and facility wherewith 'tis governed. *Temple's Miscellanies.*

A *popular* man is, in truth, no better than a prostitute to common fame and to the people. *Dryden.*

Your mind has been above the wretched affectation of *popularity*. *Id.*

Influenced by the rabble's bloody will,
With thumbs bent back, they *popularly* kill. *Id.*

His virtues have undone his country,
Such *popular* humanity is treason. *Addison's Cato.*

Now swarms the *populace*, a countless throng,
Youth and hoar age tumultuous pour along. *Pope.*

Admire we then,
Or *popularity*, or stars, or strings,
The mob's applauses, or the gifts of kings? *Id.*

The tribunes and people having subdued all competitors, began the last game of a prevalent *populace*, to chuse themselves a master. *Swift.*

He could be at the head of no factions and cabals, nor attended by a hired rabble, which his flatterers might represent as *popularity*. *Id.*

How *populous*, how vital is the grave!
This is creation's melancholy vault,
The vale funereal, the sad cypress gloom,
The land of apparitions, empty shades! *Young.*

POPULATION. Few of our readers will be unacquainted with the modern investigation of this interesting subject, and the alleged discoveries of Mr. Malthus and his school.

Dr. Adam Smith had previously observed:—'Every species of animals naturally multiplies in proportion to the means of their subsistence, and no species *can* ever multiply beyond it. But in civilised society it is only among the inferior ranks of people that the scantiness of subsistence can set limits to the further multiplication of the human species; and it can do so in no other way than by destroying a great part of the children which their fruitful marriages produce. The liberal reward of labor, by enabling them to provide better for their children, and consequently to bring up a greater number, naturally tends to widen and extend those limits. It deserves to be remarked, too, that it necessarily does this *as nearly as possible* in the proportion which the demand for labor requires. If this demand is continually increasing, the reward of labor must necessarily encourage in such a manner the marriage and multiplication of laborers, as may enable them to supply that continually increasing demand by a continually increasing population. If the reward should at any time be less than what was requisite for this purpose, the deficiency of hands would soon raise it; and, if it should at any time be more, their excessive multiplication would soon lower it to this necessary rate. The market would be so much under-stocked with labor in the one case, and so much over-stocked in the other, as would soon force back its price to that proper rate which the circumstances of the society required. It is in this manner that the demand for men, like that for any other commodity, necessarily regulates the production of men; quickens it when it goes on too slowly, and stops it when it advances too fast. It is this demand which regulates and determines the state of propagation in all the different countries of the world, in North America, in Europe, and in China; which renders it rapidly progressive in the first, slow and gradual in the second, and altogether stationary in the last.'—*Wealth of Nations*, vol. i.

In another part of his great work he expresses the same idea in fewer words:—'Countries are populous, not in proportion to the number of people whom their produce can clothe and lodge, but in proportion to that of those whom it can feed.'

The first of these passages is said to have given rise to the celebrated Essay of Mr. Malthus.

In this work not only are the different rates of population in various countries adverted to at considerable length, and that of the newer contrasted with the older nations of the world, but the assumptions of almost all former writers on the subject, that a high degree of population is conducive to national wealth and security, is contradicted, and such a situation broadly represented as one pregnant with great existing evils, and imminent dangers for the future. Mr. Malthus is

by no means to be restrained within the limits of the ground that is taken by the author of the Wealth of Nations. Far from thinking that the human species *cannot*, as Dr. Smith says, 'ever multiply' beyond the means of subsistence, he considers that it has a constant and fearful tendency to do so; and that, in point of fact, *this* tendency has generated a large portion of the vice and misery with which the older countries of the world abound. That this is an evil, therefore, which requires to be arrested in its progress; that early marriages among the poor should, upon this principle, be discouraged, and in some cases punished; and that all the charity of superior classes, which encourages the poor to multiply (which every increase of their comforts he is compelled to admit will), is wrong. He, therefore, proposes the enactment of a law whereby it should be declared, that no legitimate child born one year from the date of its promulgation; and no illegitimate child, born within two years, should thereafter be afforded parish assistance. This statutory exhibition of the tender mercies of his system, our author would have read by the clergyman to the poor, as they come to the altar.

The principles of Mr. Malthus's theory are contained in the first two chapters of his Essay, 2 vols. 4. edit. They may be thus condensed:— Population in very favorable circumstances, as in the newly settled countries of America, has been found, it is said, to double itself every twenty-five years. This rate is therefore assumed to be (at the least) its natural rate of increase, which might go on ad infinitum, if interrupted by no checks. But it is evident that the increase of food (land being an absolute quantity) could by no methods be augmented to such an indefinite extent. It might possibly double itself for once in twenty-five years, while the best lands remained uncultivated; but, so far from following up this ratio of increase in subsequent periods, it cannot even be supposed possible that its produce could be augmented even in the simple ratio of its original quantity. 'The necessary effects of these two different rates of increase,' says Mr. Malthus (and he begs his readers to bear the passage in mind), 'when brought together will be very striking. Let us call the population of this island 11,000,000, and suppose the present produce equal to the easy support of such a number. In the first twenty-five years the population would be 22,000,000, and, the food being also doubled, the means of subsistence would be equal to this increase. In the next twenty-five years the population would be 44,000,000; and the means of subsistence only equal to the support of 33,000,000. In the next period the population would be 88,000,000, and the means of subsistence just equal to the support of half that number. And at the conclusion of the first century the population would be 176,000,000, and the means of subsistence only equal to the support of 55,000,000, leaving a population of 121,000,000 totally unprovided for.'

Extending this reasoning to the whole earth, it will be found that the population of the world would increase in a geometrical ratio as 1.2.4.8. 16.32.64.128.256, and subsistence only in an arithmetical ratio as 1.2.3.4.5.6.7.8.9. In two centuries the population would be, therefore, according to this mode of reckoning, to the possible means of subsistence, as 256 to 9; in three centuries, as 4096 to 13; and as of course there are ultimate limits to the produce of the earth, an end must come to any increase in the supply of food, while the principle of population still retains its full force. Such is the account rendered by Mr. Malthus of the dispensation of Providence with respect to the natural power of increase in mankind, and their subsistence respectively.

But as it is evident that in point of fact, mankind, unable to exist without food, do not increase in the abovementioned geometrical ratio, but precisely in that in which food is produced for their support, Mr. Malthus, in his second chapter, enumerates, what he is pleased to call the checks to this exuberant power of production. They consist of 'all those customs, and all those diseases, which seem to be generated by a scarcity of the means of subsistence; and all those causes, independent of this scarcity, whether of a moral or physical nature, which tend prematurely to weaken or destroy the human frame.' These checks may be classed under two general heads, the *preventive* and the *positive;* the former consisting of prudential abstinence from marriage, which when accompanied by irregular intercourse between the sexes, produces aggravated vice and misery; when accompanied by moral restraint produces comparative comfort. The latter, consisting of every cause, whether arising from vice or misery, which in any degree tends to shorten the duration or repress the productive power of human life; such as extreme poverty, wars, diseases, famine, pestilence, and the like. The obstacles to the increase of population, therefore, whether classed under the positive or preventive checks, are all resolvable into moral restraint, vice, or misery. And as the former (explained to mean any abstinence from marriage, unaccompanied by irregular gratification), is the only mode of escaping the encounter of the two latter in some form or other, it is evident that upon this theory the whole onus of counteracting, consistently with human happiness and virtue, the immense disproportion of the relative powers of increase above enumerated, rests entirely upon this single conservative principle. It follows of course also, that the more it can be made to operate, the greater portion of virtue and happiness will be found in society. And, as it is upon the lower ranks that the vice and misery alleged to arise from a redundant population particularly press, it evidently becomes the duty of governments so to model their political arrangements as to lend encouragement to such protracted abstinence from marriage, from the moment that the produce of the land after its first period of doubling sinks into the regular arithmetical progress; or, in plainer terms, from the moment that a country emerges from the purely agricultural state of society into one compounded of agriculture and commerce. Such is the theory of Mr. Malthus, and such are its consequences.

Granting the premises, it is indeed perfectly obvious that this conclusion is undeniable.

'Once persuade a man,' as it has been well said, 'against all experience, that the oak in his field hath a natural tendency to increase ad infinitum in the same ratio as during the first fifty years, and may in time overshadow his whole estate, unless checked by the axe, and his prudent course of conduct will not long be doubtful.'

Our limits will not permit us to advert to what we conceive to be the origin of the mistakes and false reasonings of this school, with respect to the principle of population. It is *the assumption of a general tendency to increase in the human species, the quickest that can be proved possible in a particular state of society.* In other words, to confound a possible with a probable increase, or rather a mere power with a *tendency* to multiply in a given proportion.

Having assumed this tendency, then supposed *checks* are called in to make the facts of human history agree with the system. We apply the term *assumed* both to the tendency and the checks, because we think with Mr. Mill that 'the statements respecting the rate of procreation in different countries will be found to be either suppositions with respect to matters of fact, upon the conformity of which suppositions to any real matters of fact, we can have no assurance; or statements of fact of such a nature as prove nothing with regard to the points in dispute.' We only wonder that, after this remarkable concession of the last writer, Mr. M'Culloch and others should regard the principle of population, as first alleged by Mr. Malthus, as so great a discovery! All surely depends on 'the rate of procreation' being at some period or place in the argument established, and 'the conformity of the suppositions' of the system to 'real matters of fact.' The term check of course implies the prevention of that which would otherwise naturally take place; it is, therefore, very incorrectly applied to denote a relative difference, invariably fixed by the primary laws of nature, and the immutable decrees of Providence. From the deception caused by the wrong use of this term, we find writers supporting such positions as the following: 'civilisation does not weaken the principle of population (Monthly Review, June 1807, p. 137);' again, 'assuming a peopled portion of the earth, there is a point at which its produce would be a maximum; there is no point, however, at which the people upon it, however numerous, might not under advantageous circumstances go on increasing without number. Besides, while the soil is still capable of increasing its produce, yet if it be approaching somewhere near the limit of its capacity, the increase of its produce cannot possibly keep pace with the natural, or rather the possible, increase of the population upon it.' (Christian Observer, July 1807, p. 452). These are, in truth, but natural corollaries from Mr. Malthus's premises, who asserts of population, 'that 100,000,000 are just as easily doubled every twenty-five years as 1000,' and 'population, could it be supplied with food, would go on with unexhausted vigor; and the increase of one period would furnish the power of a greater increase the next, and this without any limit.' (Malthus, vol. I. p. 8). And again, 'it is not the question in England, whether by cultivating all our commons we could raise considerably more corn than at present, but whether we could raise sufficient for a population of 20,000,000 in the next twenty-five years, and 40,000,000 in the next fifty years?' as if it were possible, that the people of England, one-third of whom are asserted by this very writer to live in towns, and consequently not to keep up their own numbers, could by any possible means increase so fast as to double their total amount in twenty-five years: which is assumed as the quickest possible rate in the agricultural state of society, where the employment and situation of the people are most favorable to population.

We contend that those of our readers who wish clearly to understand the principle of population, should abandon this *assumed* data, and proceed at once to enquire into the degree in which population naturally and really operates in the several stages of society.

We will offer a few hints on the chief points of enquiry that will thus arise. In newly settled and purely agricultural countries, where the progress of population is infinitely the fastest, it can never overtake the supply of food, as long as this first state of society continues, for these plain reasons: that land will always produce, even in a very inferior state of cultivation, much more than sufficient food to support the cultivators, and the simple artisans attached to them; and that where good land can be had for nothing, the love of property and independence will find it occupiers, although no immediate demand may exist for the produce beyond the place of its production, and the family which occupies the farm. The surplus produce, however, which such a country is capable of raising, will usually find purchasers among the commercial and manufacturing nations whose wants create a demand for it. This demand will ensure its growth, and the returns from its export to those countries will afford to the growers many necessary or convenient manufactures, besides a capital which will enable them to settle their children upon fresh land. This state of society, and the rapid progress of population attending it, will continue, in the natural order of things, till all the best and most conveniently situated spots of land are occupied; and it would require the application of a large sum, on a remote prospect of return, to bring the remainder into cultivation. Till this point, a country may be said to be in the agricultural state of society, and the population is evidently far within the limits of the actual supply of food.

At this period, the children of the farmers, unless their industry be violently depressed by ignorance or tyranny, will turn their views to trade and manufactures; which would then become the most profitable employment of capital. They would bring up their children also to the same occupations, and, though capital made in trade might be occasionally realised in land, it would usually be by the purchase of that already cultivated, rather than by the cultivation of the barren and more ungrateful tracts. The surplus produce of the land, before exported to manufacturing countries, will now be consumed by

the domestic workmen; and the goods before imported will be wrought at home; at first only in sufficient quantities for the domestic demand, but at length for the purpose of exporting them to other countries, which have not yet advanced beyond the agricultural state of society.

As soon as this manufacturing population is sufficiently numerous nearly to consume the surplus produce formerly exported, and it becomes difficult to procure grain for the various purposes of luxury, or convenience, to which it is applied in all commercial countries, its price will rise; and this, let it be observed, before any actual pressure of distress for a mere sufficiency of subsistence occurs. This rise in the price will tempt the capitalist to lay out his money in bringing inferior waste land into cultivation, or in undertaking agricultural improvements, by which the old lands may be made to produce somewhat more food with an equal quantity of labor. As this mode of procuring food, however, is evidently much slower in operation, and its increased quantity, in a given space of time or territory, less abundant than in the agricultural state of society, it is clear, that if the natural progress of population continued the same, it must shortly overtake the supply of food, and verify the positions just disputed. Let us see, therefore, whether the manner in which this manufacturing and commercial population arranges itself, and the moral and physical effects produced by their employments, dispositions, and spontaneous distribution, do not naturally weaken the principle of population as it originally subsisted, and reduce it as nearly to a par with the diminished power of production in the soil, as the views of Providence for a still further amelioration will admit.

It is found that the convenience of the merchant and the manufacturer is much promoted by having their residences contiguous to each other, and by collecting round them the houses of those who are employed in the various departments of their industry, and in supplying them with the necessaries and conveniences of life. They will, therefore, fix upon a favorable spot, in the midst of an extensive neighbourhood, where first a knot of houses will be formed, next a village, and at length a town, by the accession of more manufacturers, and of many of those who before carried on trades in the country, but who are tempted by the superior convenience of markets and intercourse to migrate to the town. From various other causes too, not necessary now to detail, towns will arise. In manufacturing countries the rise of many has been witnessed even in recent times; till at length the independent proprietors, the farmers and agricultural laborers, and the very simple artisans, will be the only inhabitants remaining in the country. These will convey their stock, or its produce, to the market in the town, and return thence with the manufactured goods they may want. Two descriptions of inhabitants will thus be formed,—the townsman, and the countryman; and the habits, manners, and relative condition of each will naturally and spontaneously produce a very essential difference in their relative tendencies to contribute to the increase of population; while the progress of civilisation, universally attendant upon commercial prosperity, will considerably diminish the absolute power of such increase throughout the whole community; and as we would undertake to show, without any necessary increase of vice and misery. Care, forecast, anxieties of mind. emulation, severe attention to business, various active avocations, and the general incompatibility of the marriage state with this new order of pursuits, form the first natural causes of a *diminished* tendency in the population to increase, incident to the prosperous conduct of trade and manufactures. For there seems to be no doubt, that in proportion to the continued necessity of mental exertion or abstraction, many, who could well afford to rear a family, are placed in situations and pursuits where a voluntary abstinence from marriage, and the incapacity and indisposition to rear large families, become very general. Moreover, the comparatively unfavorable state of the atmosphere even in towns of a moderate size, and the confinement, and unhealthy occupations of the inhabitants, not only weaken the robust state of health necessary to the production of a numerous and healthy progeny, and diminish the number of births; but likewise very much shorten the period of human life in those situations, and increase the proportion of deaths. The average number of births to a marriage in towns has been calculated at between three and four, while in the country it is said to amount to four and a half or five; and even in moderate towns, such as Newbury containing a concentrated population of not more than about 4200 souls, the deaths are to the population as one in twenty-eight or twenty-nine; while, in the purely agricultural villages, they often do not exceed the proportion of one in fifty or sixty. Here then are two natural and unavoidable causes very strongly tending to weaken the principle of population. Moreover, the artificial wants, which are converted into necessaries of life at every step in the progress of civilisation, render the support of a wife and family more difficult, consistently with retaining other personal enjoyments, and cannot but diminish in some degree the proportion of marriages throughout the whole community. So that the triple operation of a decrease in the number of marriages, diminished fertility in the human species, and an augmented proportion of deaths immediately begins, by the natural and unavoidable course of nature, to repress the progress of population as soon as a part of the people are collected into towns.

This progress will indeed be retarded less during the earlier stages of the commercial and manufacturing states of society than afterwards, when towns become larger, population more dense, and civilisation more general. Nor is it necessary that in these earlier stages population should be so much retarded. For, as the power of the land is still capable of supporting a rapid increase of people from its surplus produce before exported, some time must necessarily elapse before population, though with a very trifling abatement in its progress, would begin to press against the actual supply of food. The labor of

one family employed in tilling the earth, even in this early stage of agricultural improvement, may be fairly accounted able to support itself, and two others: two-thirds of the whole population may therefore by degrees become engaged in manufactures and commerce, in unprofitable professions, or may be living idly on the fruits of former industry, before a demand arises for a further increase of food. But, long before a nation can have two-thirds of its people thus occupied, a great proportion of it must reside in large towns, and the introduction of luxury, and an artificial state of society, must have produced many imaginary wants among the country residents. Many of the people will be also lifted above the rank of the lower orders, and be affected by those artificial arrangements of society which, though they universally produce high mental cultivation, do very much diminish the natural powers of increase in mankind. Hence, from the diminished average of marriages and births, and the increase of premature mortality, a very great proportion of the population will cease to produce its own number; and a considerable deficiency will remain to be filled up by the peasantry, or lower order of country residents: the most productive class in every well-regulated community

Thus it appears that, in proportion as the population advances towards an equality with the surplus produce, existing at the first emergence of a country from the purely agricultural state, in such, precisely, will its progress naturally become slower, by the inevitable and unalterable laws of Providence; though the people be left as perfectly at liberty to follow the dictates of their own inclinations as is consistent with a free and well-regulated government. Let it be observed, also, that this effect will be produced by certain and unerring causes, which can by no human means be very materially altered. It is as impossible to render the residents in towns more fruitful, to make the air of towns more wholesome to infants, to induce any large proportion of those who wish to abstain from marriage for their own convenience to enter into that contract, as it would be to feed the increased population that would follow, supposing the possibility of their production to exist. The abatement in the progress of population is voluntary, natural, and unavoidable. It is another question, certainly, how far it necessarily produces an increase of vice and misery, and how far that species of moral restraint which consists in involuntary abstinence, be either necessary or useful to the welfare of the people. All that is here asserted is, that the abatement is the necessary consequence of the progress of society, and that to exclaim against its effects is in fact to exclaim against all advancement of a country beyond the purely agricultural state.

The result will be in an advanced state of society, by new capital being naturally thrown into agriculture, until each gradation of the soil is made productive by improved modes of culture, &c., that one family employed in agricultural pursuits will be able at least to support itself and three others. Three-fourths of the people therefore will be left at large to follow manufactures, or non-productive employments, to be the menial servants of the higher orders, to navigate the ships, and fight the battles of the country. Of these three-fourths, at least two-thirds, or one-half of the whole population, would cease to reproduce their own numbers of efficient people. This will be evident to any one who considers that in a state of society where so large a proportion of the people are merchants, manufacturers, or idle persons, at least one-third of the whole population must dwell in towns, some in very large towns; and that the remainder of those, who are calculated not to reproduce their own numbers, principally consists of soldiers, sailors, men of good families but small fortunes, servants, dependents, and emigrants to colonies, or other places. These are usually taken out of the mass of the population in the prime of life, but before they have contributed children to replace their loss, which must therefore be filled up by the children of others. And, with respect to the towns, it is proved to demonstration, that, even of those of a moderate size, not one can keep up its own effective population.

Mr. Weyland, who has adopted and ably advocated this view of the subject shows, that, 'an excess of annual deaths above annual births of seven in each 1000 of existing persons has been considered as a low average in towns even of a moderate size. Upon this datum, seven emigrants per 1000 from the country will be required to keep up the population of a town, even if the population of the town were stationary; but, if from an increase in the demand for labor it were rapidly extending itself, of course a larger influx of settlers must take place.

In a country containing a population of 9,000,000, the following is what Mr. Weyland conceives would be the distribution of the people according to the state of society supposed:—

1. One-third in towns (not reproducing their own numbers). . .	3,000,000
2. One-fourth in agriculture (reproducing their own numbers and supplying the deficiencies in the towns, &c.)	2,250,000
3. A fourth of the remainder, men of rank and fortune with their families, unemployed descendants, and servants (not reproducing their own numbers).	937,500
4. Army, navy, mercantile and military, emigrants to foreign settlements with their families and attendants (almost entirely supplied from the classes reproducing their own numbers).	46[illegible],750
5. Country manufacturers, shopkeepers, small proprietors, &c., with their families (reproducing their own numbers, but affording no material supply to the deficiency of the other classes). . . .	2,343,750
Total	9,000,000

The three classes not reproducing their own numbers leaving a deficiency of at least a fifth

of their aggregate number, or 880,000 souls in a generation, to be made up by the two other classes, principally by that marked 2.

The conclusion from this argument is, that in this more advanced stage of society, such for example as we are now living in, 'although the powers of production yet remaining in the soil are continually decreasing, yet the natural tendency of population to press against the supply of food is also decreasing in a still greater ratio; at least, in all countries where due attention is paid to religion, morals, and rational liberty.' But there may be supposed, though as yet it is only hypothetical, a still more advanced state of society: and 'it is evident, that if a community conducting itself even upon the most reasonable principles, is indefinitely to continue increasing its population, in however retarded a ratio, it must at length come to the end of its resources in food: the land being an absolute quantity, and only capable, when most fully cultivated, of making a definite return.' However remote and improbable this contingency may be, the author last quoted feels himself bound to provide against it; and argues, by an application of his previous calculations, that there is a point at which the sterile portion of the people becomes so numerous that the reproducing part will not be able by any natural fertility of its own to supply the deficiency; a point which must at length be reached, as the size of the towns is enlarged, and the habits of a highly advanced state of society are more widely extended through the several ranks of the people.

This author argues to an extent in which we cannot follow him, in favor of our poor laws. We believe that Providence intends, we are sure that Christianity commands, that the orphan, the sick, and the aged, should be supported by charity; but we also believe it to be the intention of Providence that the young and the healthy should furnish labor to the community, according to the natural demand; and that the present system in England is a deviation from the wise and simple arrangement of Providence—that system, we mean which allows every man without reference to character, strength, or age, to claim a right to support; to what becomes in effect a gratuitous support, since the return made to the parish is commonly of no sort of value, in digging gravel which nobody wants, in making pots which nobody buys, or in levelling roads which nobody travels. We believe that we shall become a more happy, more moral, and more prosperous people, in proportion as we gradually undermine habits which cannot be taken by storm, and, by encouraging the provident banks, and inducing the poor to contribute to them by every indulgence and favor shown to those who do, return to the great law of nature, that every man's condition shall ordinarily be proportioned to his own prudence, morality, and industry.

His investigation of the poor laws is followed by an enquiry into the natural order of precedence between population and food. It has been made an inference from Mr. Malthus's reasoning, that an increase of people should always follow, and never precede an increase in the produce of the soil: 'which when applied,' observes Mr. Weyland, 'to a manufacturing society, appears to be tantamount to saying that an increase in the number of backs should always follow, and never precede, an increase in the manufacture of coats; whereas, surely a previous increase of wearers and consumers is absolutely necessary to the respective production of further food and raiment,'—p. 82. Our author proves, we think, unanswerably, that when the best lands are already cultivated, farther produce can only be elicited by a rise in the article, occasioned by the demand of the already existing claimants; and the whole detail of the subject is practically and fully entered upon; but we must here refer political economists to the book itself. His last book is devoted to the moral consequence deducible from the principles for which he argues, i. e. the nature and extent of the duty of charity, and the propriety of leaving to the lower orders the free option of marriage. On these points we cordially agree with him. 'If it be true, as asserted,' he argues, 'that population has in all cases a tendency of itself to exceed the supply of food for its support; since we can scarcely assist the poor in any way without encouraging them to produce, and enabling them to rear a greater number of children, or at least without prolonging the existence of the objects of our charity; it is evident that by every exertion of it we are only increasing the quantum of human misery. While we assist some, we are proportionably depressing others, and adding to that number which is already exuberant to a fault.'—p. 334.

In the face of this cheerless doctrine, he contends, that it is the poor man, who feels himself neglected, degraded, and an outcast as it were from his fellows, who becomes morose, brutish, and incorrigibly *selfish* in his pursuits. *He* it is whose natural feelings, not being softened down by intercourse with more enlightened men, nor by any sense of gratitude, yield to the first temptation offered to his passions; and who, restrained by no check, moral or natural, by no sense of respect towards others or himself, is impelled to the multiplication of his species like the brutes that perish. 'I am ready to acknowledge,' says our author, 'that the population thus raised is checked only by the rule which regulates the number of the brutes; viz. by the perpetual contest between the powers of procreation and the principle of destruction—a rule which, when applied to the human species, involves almost every modification of vice and misery.'

The most original of our author's observations on marriage is that which points out the injustice of expecting equal restraint on this head, in the members of the lower and the higher classes of the community. The lower orders have fewer enjoyments to substitute for it, and infinitely fewer means of avoiding the temptations to vice, which an involuntary abstinence from marriage necessarily multiplies. Their mental resources being deficient, they are more in want of other gratifications, and of the means of humanising their minds by the enjoyment of the social affections. The conclusion is thus drawn:—'in

unison with the apparent equity of the divine dispensations, with our sense of natural justice, and with the express commands and unqualified permissions of Scripture on the subject. It appears then, upon the whole, that no moral impediment to the progress of society, or to the natural tendency of population to keep within due bounds, is to be apprehended from as general prevalence of matrimonial connexions as the existing state of society will admit; nay, that a perfect liberty in this respect is essential to a healthy progress. We perceive that the principle of population introduces no new duty, nor any necessary increase of vice and misery as society advances, and the land arrives nearer to its point of complete cultivation. I think upon the whole that an early marriage, and a young family, is a strong incentive to sobriety, industry, and decency, in a poor man, wherever his moral and religious instructors come in aid of his natural feelings of affection towards his wife and children. I have seldom seen the workings of good advice upon natural affections fail in their effect, except in old and very hardened profligates; and I have very frequently beheld the combination of the two effectual in reclaiming a loose and thoughtless character. I should be sorry, however, to be so far misunderstood, as to be thought to assert that it would be consistent with the good of the state to afford to every idle and abandoned strippling the means of entering into the marriage contract, although he possess neither the will nor the intention of laboring for the support of his family, nor be in a capacity to have set before him in a forcible manner his duties in these respects. For truly I have never yet been able to discover, nor should I be very industrious in searching for, any scheme of polity which can enable the machinery of society to work freely and profitably, notwithstanding the general neglect of moral habits and precautions.'—p. 413, 414.

The result of the whole is that, by the arrangements of a wise and beneficent Creator, 'mankind,' as Sir William Jones has beautifully said, 'cannot long be happy without virtue, nor actively virtuous without freedom, nor securely free without rational knowledge;' but that happiness is placed within the reach, commonly of the individual, and always of the community, in proportion as honest industry flourishes, in proportion as sound religion inculcates pure morality, and the diffusion of rational knowledge secures public and private liberty.

We can only observe, in conclusion, that after having seen the Essay of Mr. Malthus popular on both sides the Tweed, and occasionally shedding its baleful influence on the deliberations of the legislature, we are in no small degree edified and comforted by the disposition to retractation —politically called, we believe, 'ratting,' upon this subject, observable in the last number of the Quarterly Review. After having (No 51) stated Mr. Malthus's 'principle,' and its 'grand deductions' to remain 'unrefuted,' and that 'an inherent tendency to double in population' must be 'admitted,' while no such 'tendency is found in the fertility of the earth,' it argues something for the march of intellect, in our estimation, to find this influential periodical at last consider that Mr. Malthus has but 'contrived to revive and elevate into popularity a theory originally broached by a philosophical infidel of the seventeenth century:' that 'in the teeth, to all appearance, of the Malthusian theory,' it is '*proved* by indisputable evidence that the present condition of the peasantry of Ireland, however destitute and miserable, is still much superior to that of the population of the same island some centuries ago;' though '*the disciples* of Mr. Malthus use the number of idle and unoccupied laborers as an argument to prove that the present population of Ireland is redundant, &c.' Lastly, that 'we are enabled to *pronounce*, upon evidence which cannot be disputed, that, whatever increase may have taken place in the population of Ireland within the last 200 years, the produce raised in that country for subsisting them has increased in *a much greater ratio*. *See our tabular view of Population.*

POPULUS, the poplar, a genus of the octandria order, and diœcia class of plants; in the natural method ranking under the fiftieth order, amentaceæ. The calyx of the amentum is a lacerated, oblong, and squamous leaf; the corolla is turbinated, oblique, and entire. The female has the calyx of the amentum and corolla the same as in the male; the stigma is quadrifid; the capsule bilocular, with many pappous seeds. It is often mentioned by the poets, Virgil, Ovid, Horace, Catullus, &c. The principal species are these: 1. P. alba, the abele tree, is a large tree, and grows naturally in the temperate parts of Europe. Its leaves are large, divided into three, four, or five lobes, indented on their edges, of a very dark color on their upper side; standing upon foot-stalks an inch long. The young branches have a purple bark, and are covered with a white down; but the bark of the stem and older branches is gray. In the beginning of April, the male flowers or catkins appear, which are cylindrical, and about three inches long. About a week after come out the female flowers. Soon after these come out, the male catkins fall off; and in five or six weeks after the female flowers have ripe seeds in a hairy covering. The catkins will then drop, and the seeds be wafted by the winds to a great distance. The wood of all these trees, but especially of the abele, is good for laying floors, where it will last for many years; and on account of its extreme whiteness is by many preferred to oak; yet, on account of its soft contexture, being very subject to take the impression of nails, &c., it is less proper on this account than the harder woods. The abele likewise deserves particular notice, on account of the virtue of its bark in curing intermitting fevers. A dram powdered is given every four hours betwixt the fits. In obstinate cases, one-fifth part of Peruvian bark is given with it. See Philosophical Transactions vol. liii. p. 195. This bark will also tan leather. M. Fougeroux de Bondaroy, who made experiments on various species of poplar, reckons this the most valuable of them all, affording wood of an excellent quality.

2. P. balsamifera, the Carolina poplar, is a

native of Carolina, where it becomes a large tree. The shoots of this sort grow very strong in Britain, and are generally angular; with a light green bark like the willow. The leaves on young trees, and also those on the lower shoots, are very large, almost heart-shaped, and crenated; but those upon the older trees are smaller: as the trees advance, their bark becomes lighter, approaching to a grayish color. It may be propagated by cuttings or layers; but the last is the method generally practised, and the plants raised by it are less moist than others. The shoots of this tree, while young, are frequently killed down to a considerable length by the frost in winter; but, as the trees grow older, their shoots are not so vigorous, and become more ligneous, so are not liable to the same disaster. But the trees should be planted in a sheltered situation; for, as their leaves are very large, the wind has great power over them; and the branches being tender, they are frequently broken or split by the winds in summer, when they are much exposed. This species grows very quickly, and the wood is beautiful.

3. P. Canadensis, the liard, is a large tree, the wood light, not easy to be split, and fit for several uses.

4. P. fastigata, the Italian or Lombardy poplar, is said by M. Fougeroux de Bondaroy to be of very little value; but M. Dambourney says it is excellent for dyeing. See No. 9.

5. P. major, the white poplar, has its leaves rounder than the first, and not much above half their size: they are indented on their edges, and are downy on their under side, but not so white as those of the former, nor are their upper surfaces of such a deep green color.

6. P. nigra, the black poplar, has oval heart-shaped leaves, slightly crenated on their edges; they are smooth on both sides, and of a light green color. It is less apt to take root from large truncheons; therefore it is best to plant cuttings of it about a foot and a half in length, thrusting them a foot deep in the ground. This sort will grow almost on any soil, but will thrive best in moist places. The inner bark is used by the inhabitants of Kamtschatka as a material for bread; and paper has sometimes been made of the cottony down of the seeds. The roots dissolve into a kind of gelatinous substance, and are coated over with a tubular crustaceous spar, called by naturalists osteocolla, formerly imagined to have some virtue in producing the callus of a fractured bone. See OSTEOCOLLA.

7. P. tacamahaca, grows naturally in Canada and other parts of North America. This is a tree of a middling growth, but sometimes grows to thirty feet high, sending out on every side many short thick shoots, which are covered with a light brown bark, garnished with leaves differing from one another in shape and size; most of them are almost heart-shaped; but some are oval, and others nearly spear-shaped; they are whitish on their under side, but green on their upper. The buds are covered with a glutinous resin, which smells very strong, and is the gum tacamahaca of the shops. The best, called, from its being collected in a kind of gourd-shells, tacamahaca in shells, is somewhat unctuous and softish, of a pale yellowish or greenish color, an aromatic taste, and a fragrant delightful smell approaching to that of lavender or ambergris. This sort is very rare; that commonly found in the shops is in semitransparent globes or grains, of a whitish, yellowish, brownish, or greenish color, of a less grateful smell than the foregoing. This resin is said to be employed externally by the Indians for discussing and maturating tumors, and abating pains in the limbs. It is an ingredient in some anodyne, hysteric, cephalic, and stomachic plasters; but the fragrance of the finer sort sufficiently points out its utility in other respects. The tacamahaca sends up a great number of suckers from its roots, by which it multiplies in plenty; and every cutting which is planted will take root.

8. P. tremula, the aspen tree, has roundish, angularly indented leaves: they are smooth on both sides, and stand on long foot-stalks, and so are shaken by the least wind; whence it has the title of the trembling poplar, or aspen tree.

9. P. Virginiana, the Virginia poplar, affords a wood of excellent quality, that may be applied to many uses. All these trees may be propagated either by layers or cuttings, as also from suckers which the white poplars send up from their roots in great plenty. The best time for transplanting these suckers is in October, when their leaves begin to decay. These may be placed in a nursery for two or three years, to get strength before they are planted out where they are designed to remain; but, if they are propagated from cuttings, it is better to defer that until February, when truncheons of two or three feet long should be thrust about a foot and a half into the ground. These will readily take root; and, if they be planted in a moist soil, they will arrive at a considerable bulk in a few years. From some experiments, made by M. Dambourney, it appears that the poplar may be usefully employed in dyeing. The Italian poplar gives a dye of as fine a lustre, and equally durable, as that of the finest yellow wood, and its color is more easily extracted. It is likewise very apt to unite with other colors in composition. Besides the populus fastigata, M. Dambourney tried also the Nigta, the Virginiana, the Canadensis, the alba, and the tremula; and found that all these dyed wool of a nut-color, fawn-color (vigogne), Nankin, musk, and other grave shades, according to the quantity of wood employed, and the length of time it was boiled.

POQUELIN. See MOLIERE.

PORANA, in botany, a genus of the monogynia order, and pentandria class of plants. The corolla is campanulated; the calyx is quinquefid, and larger than the fruit; the style semibifid, long, and permanent; the stigmata globular; the perianthium bivalved.

POR'CELAIN, *n. s.* Fr. *porcelaine;* barb. Lat. *porcellus,* said to be derived from pour cent années; because it was believed by Europeans, that the materials of porcelain were matured under ground 100 years. China; china ware. See below.

We have burials in several earths, where we put divers cements, as the Chinese do their *porcelain.*

Bacon.

We are not thoroughly resolved concerning *porcelain* or china dishes; that according to common belief, they are made of earth, which lieth in preparation about a hundred years under ground.

Browne's Vulgar Errours.

The fine materials made it weak:
Porcelain, by being pure, is apt to break.

Dryden.

These look like the workmanship of heaven:
This is the *porcelain* clay of human kind,
And therefore cast into these noble moulds. *Id.*

PORCELAIN is a fine kind of earthenware, chiefly manufactured in China, and thence sometimes called China-ware. All earthen wares which are white and semitransparent are also called porcelains: but among these, great differences are so evident, that even persons who are not connoisseurs in this way, prefer much the porcelain of some countries to that of others. The word porcelain is clearly of European derivation; as the Chinese language has no such sounds. Some derive it from porcelana, which in Portuguese signifies a cup. Porcelain is called in China tsé-ki. The first porcelain seen in Europe was brought from Japan and China. The first European porcelains were made in Saxony and in France; and afterwards in England, Germany, and Italy: but, as all these were different from the Japanese, so each of them had its peculiar character. The finest and best porcelain of China is made in a village called King-te-ching, in the province of Kiang-si. This celebrated village (as they call it, for the villages of China are larger than the cities of Europe), is a league and a half in length, and contains, we are assured, a million of inhabitants. The workmen, invited by the attracting allurements of the European trade, have established manufactories also in the provinces of Fokien and Canton; but this porcelain is not esteemed. It is not known who first found out the art of making porcelain, nor is the date of the invention recorded. But it is certain that the manufacture has been carried on in King-te-ching at least since A. D. 442, if not long before that period.

F. D'Entrecolles, a Romish missionary, gives an account of the method of making porcelain, of which Grosier has an abridgment, in his General Description of China, as follows: 'The principal ingredients of the fine porcelain are pe-tun-tse and kao-lin, two kinds of earth from the mixture of which the paste is produced. The kao-lin is intermixed with small shining particles; the other is purely white, and very fine to the touch. These first materials are carried to the manufactories in the shape of bricks. The pe-tun-tse, which is so fine, is nothing else but fragments of rock taken from certain quarries, and reduced to powder. Every kind of stone is not fit for this purpose. The color of that which is good, say the Chinese, ought to incline a little towards green. A large iron club is used for breaking these pieces of rock: they are afterwards put into mortars; and, by means of levers, headed with stone bound round with iron, and moved by manual labor or by water, they are reduced to a very fine powder. The dust afterwards collected is thrown into a large vessel full of water, which is strongly stirred with an iron shovel. When it has been left to settle for some time, a kind of cream rises on the top, about four inches in thickness, which is skimmed off, and poured into another vessel filled with water: the water in the first vessel is stirred several times; and the cream which arises is still collected, until nothing remains but the coarse dregs, which precipitate: these dregs are carefully collected, and pounded anew. With regard to what is taken from the first vessel, it is suffered to remain in the second until it is formed into a kind of crust at the bottom. When the water above it seems quite clear, it is poured off by gently inclining the vessel, that the sediment may not be disturbed; and the paste is thrown into large moulds proper for drying it. Before it is entirely hard, it is divided into small square cakes, which are sold by the hundred. The kao-lin, which is used in the composition of porcelain, requires less labor than the pe-tun-tse. Nature has a greater share in the preparation of it. There are large mines of it in the bosoms of certain mountains, the exterior strata of which consist of a kind of red earth. These mines are very deep, and the kao-lin is found in small lumps, that are formed into bricks after having gone through the same process as the pe-tun-tse. It is from the kao-lin that fine porcelain derives all its strength. The Chinese have also discovered a substance proper to be employed in the composition of porcelain. It is a stone, or rather a species of chalk, called hoa-che, from which the physicians prepare a kind of draught that is said to be detersive, aperient, and cooling. It is glutinous, and has a resemblance to soap. Porcelain made with hoa-che is very rare, and much dearer than any other. It has an exceedingly fine grain, and, with regard to the painting, if it be compared with that of the common porcelain, it appears to surpass it much. This porcelain is, besides, so light, that it surprises those who are accustomed to handle other kinds; it is also much more brittle: it is very difficult to hit upon the proper degree of tempering it. Hoa-che is seldom used in forming the body of the work; the vessel is plunged when dry, that it may receive a coat before it is painted and varnished. But Hoa-che, when washed, pounded, and dissolved in water, is alone sufficient to make porcelain; and is used instead of kao-lin; but it is much dearer.

To pe-tun-tse and kao-lin, the two principal elements, must be added the oil or varnish from which it derives its splendor and whiteness. This oil is of a whitish color, and is extracted from the same kind of stone which produces the pe-tun-tse, but the whitest is always chosen, and that which has the greenest spots. The oil is obtained from it by the same process used in making the pe-tun-tse. To 100 lbs. of its cream is added one pound of che-kao, a mineral something like alum, which is put into the fire till it becomes red hot and then pounded. This mineral is a kind of runnet, and gives a consistence to the oil, which is however carefully preserved in its state of fluidity. The oil thus preserved is never employed alone, another oil must be mixed with it, which is extracted from lime and fern ashes, to 100 lbs. of which is also added a pound of che-kao. When these two oils are mixed, they must be equally thick. With regard to the quan

tity necessary to be employed, it is usual to mix ten measures of stone oil with one measure of the oil made from lime and fern ashes. The first labor consists in again purifying the pe-tun-tse and the kao-lin. The workmen then proceed to mix these two substances together. For fine porcelain they put an equal quantity of the kao-lin and the pe-tun-tse; for the middling sort they use four parts of the kao-lin and six of the pe-tun-tse. The least quantity put of the former is one part to three of the pe-tun-tse. When this mixture is finished, the mass is thrown into a large pit, well paved and cemented in every part; it is then trod upon, and kneaded until it becomes hard. From this mass, thus prepared, the workmen detach different pieces which they spread out upon large slates where they knead and roll them in every direction, carefully observing to leave no vacuum in them, and to keep them free from the mixture of any extraneous body. A hair or a grain of sand would spoil the whole work. When this paste has not been properly prepared, the porcelain cracks, and melts or becomes warped. All plain works are fashioned with the wheel. When a cup has undergone this operation, the outside of its bottom is quite round. The first workman gives it the requisite height and diameter, this cup then passes to a second workman, who forms its base; soon after a third applies it to his mould, and gives it a proper form; a fourth polishes it with a chisel, and the last workman fashions its bottom with a chisel. Some vases thus pass, with astonishing dexterity and expedition, through the hands of seventy persons. Large works are executed in parts which are fashioned separately. When all the pieces are finished, and almost dry, they are put together and cemented with paste made of the same substance, and softened with water. Some time after the seams are polished with a knife, both without and within; and, when the vessel is covered with varnish, the least trace of them is not to be seen. In this manner, spouts, handles, rings, and other parts are added; and embossed works, grotesque images, figures of trees, animals, busts, &c., are brought to perfection. With regard to those flowers and ornaments which are not in relief, they are either engraven or imprinted with a stamp. Ornaments in relief prepared separately are also added to pieces of porcelain, almost in the same manner as lace is put upon a coat.

After a piece of porcelain has been properly fashioned, it then passes into the hands of the painters. These heapei, or painters, are very little acquainted with the rules of drawing; all their skill being acquired by practice, though some of them display taste and genius. The labor of painting, in these manufactories, is divided among a great number of hands. One is entirely employed in tracing out the first colored circle, which ornaments the brims of the vessel; another designs the flowers, and a third paints them; one delineates waters and mountains, and another birds and other animals; human figures are worst executed. The tsou-you, which is a kind of oil procured from white flint, has the peculiar property of making those pieces of porcelain upon which it is laid appear to be covered with an infinitude of veins in every direction; at a distance one would take them for cracked vases, the fragments of which have not been displaced. The color communicated by this oil is a white, somewhat inclining to that of ashes. If it be laid upon porcelain, entirely of an azure blue, it will appear in the same manner to be variegated with beautiful veins. This kind of porcelain is called tsoui-ki. The Chinese make vases also ornamented with a kind of fret-work, perforated in such a manner as to resemble a very fine lace. In the middle is placed a cup proper for holding any liquid; and this cup makes only one body with the former, which appears like a lace wrapped round it. The Chinese workmen had formerly the secret of making a still more singular kind of porcelain: they painted upon the sides of the vessel fishes, insects, and other animals, which could not be perceived until it was filled with water. This secret is in a great measure lost; the following part of the process, is, however, preserved:—The porcelain, which the workmen intend to paint in this manner, must be extremely thin and delicate. When it is dry, the color is laid on pretty thick, not on the outside, as is generally done, but on the inside. The figures painted upon it, for the most part, are fishes, as being more analogous to the water with which the vessel is filled. When the color is thoroughly dry, it is coated over with a kind of size, made with porcelain earth; so that the azure is entirely enclosed between two laminæ of earth; when the size becomes dry, the workman pours some oil into the vessel, and afterwards puts it upon a mould and applies it to the lath. As this piece of porcelain has received its consistence and body within, it is made as thin on the outside as possible, without penetrating to the color; its exterior surface is then dipped in oil, and when dry it is baked in a common furnace. The art of making these vases requires the most delicate care, and a dexterity which the Chinese perhaps do not at present possess. They have, however, from time to time, made several attempts to revive the secret of this magic painting, but their success has been very imperfect. This kind of porcelain is known by the name of kia-tsing, or pressed azure. After the porcelain has received its proper form, its color, and all the intended ornaments, it is put into the furnace. Each piece, however inconsiderable it may be, is enclosed in an earthen case or box. In the bottom of these boxes is put a layer of fine sand, which is covered over with powder of the kao-lin, to prevent the sand from adhering too closely to the bottom of the vessel. The piece of porcelain is then placed upon this bed of sand, and pressed gently down, that the sand may take the form of the bottom of the vessel, which does not touch the sides of its case: the case has no cover. A second prepared in the same manner, and containing its vessel, is fitted into the first, so that it entirely shuts it, without touching the porcelain which is below; and thus the surface is filled with piles of cases, which defend the pieces they contain from the too direct action of the fire. Small pieces, such as tea cups, &c., are enclosed in cases about four inches high, and sprinkled with the dust of the

kao-lin, and placed in piles. These different piles are placed very closely in the furnace; they support each other mutually by pieces of earth which bind them at the top, bottom, and middle, but in such a manner that a free passage is left for the flame to insinuate itself everywhere around them. Before each of these furnaces for baking porcelain there is a long porch, which conveys air, and supplies in certain respects the place of a bellows. They were formerly six feet high and six long; but they are now two fathoms in height, and almost four in breadth; and the sides and roof are so thick that one may lay the hand upon them without being incommoded by the heat. The dome or roof is shaped like a funnel, and has a large aperture at the top, through which clouds of flame and smoke incessantly issue. Besides this principal aperture, there are five others smaller, which are covered with broken pots, but in such a manner that the workmen can increase or diminish the heat according as it may be found most convenient: through these also he is enabled to discover when the porcelain is sufficiently baked. Having uncovered that hole which is nearest the principal aperture, he takes a pair of pincers and opens one of the cases: if he observes a bright fire in the furnace, if all the cases are red-hot, and if the colors of the porcelain appear with full lustre, he judges that it is in a proper state; he then discontinues the fire, and entirely closes up the mouth of the furnace for some time. In the bottom of the furnace there is a deep hearth about two feet in breadth, over which a plank is laid, that the workmen may enter to arrange the porcelain. When the fire is kindled on this hearth, the mouth of the furnace is immediately closed up, and an aperture is left only sufficient for the admission of faggots about a foot in length, but very narrow. The furnace is first heated for a day and night; after which two men keep continually throwing wood into it, and relieve each other by turns: 180 loads are generally consumed for one baking. As the porcelain is burning hot, the workman employs for the purpose of taking it out long scarfs or pieces of cloth, which are suspended from his neck. The Chinese divide their porcelain into several classes, according to its different degrees of fineness and beauty. The whole of the first is reserved for the emperor.

The celebrated Reaumur first considered porcelain scientifically, and submitted the fruits of his investigations to the Academy of Sciences, in two memoirs, in 1727 and 1729. He endeavoured to investigate the internal structure of different kinds of porcelain; and for that purpose procured broken pieces of the French, Saxon, and Japanese porcelains. Upon examining the difference of their grains (the technical term among potters for their internal structure), he found the Japanese to be fine, close, compact, moderately smooth, and somewhat shining. The French porcelain of St. Cloud had a grain far less close and fine than the Japanese; not shining, or but very little, and resembling the grain of sugar. The grain of the Saxon kind was found more compact than either; not granulous, but smooth and shining like enamel. Finding such considerable differences in the grain, he next examined them by fire, which discovered properties still more essentially distinct. By a violent heat the French and Saxon porcelains were melted, but the Japanese withstood the power of the most violent fire he could excite. This difference between European and Japanese porcelain suggested to our author that, as all porcelains somewhat resemble glass in consistence and transparency, they must be semivitrifications, though they are less compact, and much less transparent. He next made experiments upon the oriental porcelain, and, having exposed the Chinese Kao-lin and pe-tun-tse to a very violent fire, he discovered that the latter fused without addition, but that the former gave no signs of fusibility whatever. He afterwards mixed them, and made cakes of them, which by baking he converted into porcelain, resembling that of China. He farther discovered that the pe-tun-tse of the Chinese was a hard stone of the vitrifiable kind, but much more fusible than any of the kind known in Europe; and that the kaolin was a talky substance, reduced to a very fine powder. He afterwards attempted to make porcelain like that of the Chinese with materials found in France; but from some cause, not fully explained, he was unsuccessful in this as well as in some other experiments. He, however, in the course of these made a discovery of a process for converting common glass to a peculiar kind of porcelain, to which he gave his name, which he published in 1739. He rendered glass of a milky color, semitransparent, so hard as to strike fire with steel, infusible, and of a fibrous grain, by means of cementation. The process, which he published, is not difficult. Common glass, such as that of which wine bottles are made, succeeds best. The glass vessel which is to be converted into porcelain is to be enclosed in a baked earthen case or seggar. The vessel and case are to be filled with a cement composed of equal parts of sand and powdered gypsum or plaster; and the whole is to be put into a potter's kiln, and to remain there during the baking of common earthenware; after which the glass vessel will be found transformed into such a matter as has been described. See POTTERY and STAFFORDSHIRE.

PORCH, *n. s.* Fr. *parche;* Lat. *porticus.* A roofed entrance before a door; any entrance.

> Ehud went forth through the *porch*, and shut the doors of the parlour. *Judges* iii. 23.

> All this done,
> Repair to Pompey's *porch*, where you shall find us.
> *Shakspeare.*

> Not infants in the *porch* of life were free,
> The sick, the old, that could but hope a day
> Longer by nature's bounty, not let stay.
> *Ben Jonson.*

A PORCH, in the ancient architecture, was a vestibule, or a disposition of insulated columns usually crowned with a pediment, forming a covert place before the principal door of a temple or court of justice. When a porch had four columns in front it was called a tetrastyle; when six, hexastyle; when eight, octostyle, &c.

PORCH, Gr. *στοα*, in antiquity, was a public portico in Athens adorned with the pictures of

Polygnolus and other eminent painters. It was in this portico that Zeno the philosopher taught; and hence his followers were called Stoics. See STOIC and ZENO.

PORCIA, a sister of Cato the younger, highly commended by Cicero.

PORCIA, a daughter of Cato the younger, remarkable for prudence, philosophy, courage, and conjugal tenderness. She married first Bibulus, and after his death the celebrated Marcus Brutus. She gave herself a deep wound in the thigh, and, on Brutus asking the reason, she said she wished to try if she had fortitude to bear pain, and courage to share his secrets. Brutus, astonished at her fortitude, told her of the conspiracy against Cæsar. Porcia wished him success, and kept the secret, but dreaded the event, and swooned away the day Brutus went to the assassination of Cæsar; and, when he killed himself, she followed his example.

PORCIUS. See CATO.

PORCO, a province of Buenos Ayres, commences on the west side of the town of Potosi, from which it extends twenty leagues. From its elevated situation, there is a scarcity of fruits and grain, but in the valleys the soil is fruitful, and the breeds of sheep are considerable. Such as the vicunna and the guanaco, native breeds. In this province is the mountain of Porco, from which the incas of Peru drew their silver; and it was the first mine worked by the Spaniards. The mines still produce great quantities of that metal. Population 22,000.

PORCUPINE, *n. s.* Fr. *porc espi*, or *epic*; Ital. *porcospino*; Lat. *porcus epinus*. A kind of hedge-hog.

This stubborn Cade
Fought so long, till that his thighs with darts
Were almost like a sharp-quilled *porcupine*.
Shakspeare.

Long bearded comets stick,
Like flaming *porcupines*, to their left sides,
As they would shoot their quills into their hearts.
Dryden.

By the black prince of Monomotapa's side were the glaring cat-a-mountain and the quill-darting *porcupine*. *Arbuthnot and Pope.*

The *porcupine*, when full grown, is as large as a moderate pig, there is no other difference between the *porcupine* of Malacca and that of Europe, but that the former grows to a larger size. *Hill.*

PORCUPINE, in zoology. See HYSTRIX.

PORCUPINE MAN, the name by which one Edward Lambert, who had a distempered skin, went in London. An account of him will be found in the Philosophical Transaction for 1755, by Henry Baker, F. R. S.

PORCUPINE RIVER, a river of North America, so called by captains Lewis and Clarke, from the number of porcupines found near it: it falls into the Missouri from the north, and is a bold and beautiful stream, 112 yards wide, though the water is only forty yards at its entrance. Captain Clarke ascended it several miles, and passed it above where it enters into the high lands. It is about 2000 miles from the confluence of the Missouri with the Mississippi. Also a river of the United States, in the north-west territory which runs into Lake Superior. Long. 88° W., lat. 46° 14' N.

PORE, *n. s.*, PO'ROUS, *adj.*, PO'ROUSNESS, *n. s.*, PO'RINESS, POROS'ITY. Fr. *pore*; Lat. *porus*; Gr. πορος. A spiracle or hole; particularly a spiracle of the skin; passage of perspiration: porous, porousness, poriness, porosity, follow this sense.

Witches, carrying in the air, and transforming themselves into other bodies, by ointments, and anointing themselves all over, may justly move a man to think that these fables are the effects of imagination; for it is certain that ointments do all, if laid on any thing thick, by stopping of the *pores*, shut in the vapours, and send them to the head extremely. *Bacon.*

This is a good experiment for the disclosure of the nature of colours; which of them require a finer *porosity* and which a grosser. *Id.*

Vultures and dogges have torne from every limb
His *porous* skin; and forth his soul is fled.
Chapman.

They will forcibly get into the *porousness* of it, and pass between part and part, and separate the parts of that thing one from another; as a knife doth a solid substance, by having its thinnest parts pressed into it. *Digby on Bodies.*

Why was the sight
To such a tender ball as the' eye confined,
So obvious and so easy to be quenched;
And not, as feeling, through all parts diffused,
That she might look at will through every *pore*?
Milton.

The rapid current, which through veins
Of *porous* earth with kindly thirst updrawn,
Rose a fresh fountain, and with many a rill
Watered the garden. *Id. Paradise Lost.*

From veins of vallies milk and nectar broke,
And honey sweating through the *pores* of oak.
Dryden.

Pores are small interstices between the particles of matter, which constitute every body, or between certain aggregates or combinations of them. *Quincy.*

I took off the dressings, and set the trepan above the fractured bone, considering the *poriness* of the bone below. *Wiseman.*

PORE, *v. n.* Gr. πορος is the optic nerve; 'but I imagine pore to come by corruption from some English word,' says Dr. Johnson. It is, in fact, the Span. *ojar*, *perojar* (a barb. Lat. *oculare*). To look with great intenseness and care; to examine with great attention.

All delights are vain; but that most vain,
Which, with pain purchased, doth inherit pain;
As painfully to *pore* upon a book,
To seek the light of truth, while truth the while
Doth falsely blind the eye-sight. *Shakspeare.*

Poreblind men see best in the dimmer light, and likewise have their sight stronger near at hand than those that are not *poreblind*, and can read and write smaller letters; for that the spirits visual in those that are *poreblind* are thinner and rarer than in others and therefore the greater light disperseth them.
Bacon's Natural Histo y.

A book was writ, called Tetrachordon,
The subject new: it walked the town a while
Numbering good intellects; now seldom *pored* on.
Milton.

The eye grows weary with *poring* perpetually on the same thing. *Dryden's Dufresnoy.*

Let him with pedants hunt for praise in books,
Pore out his life amongst the lazy gownmen,
Grow old and vainly proud in fancied knowledge.
Rowe.

With sharpened sight pale antiquaries *pore*,
The' inscription value, but the rust adore. *Pope.*

He hath been *poring* so long upon Fox's Martyrs, that he imagines himself living in the reign of queen Mary. *Swift.*

POREE (Charles), a French Jesuit, and dramatic writer, born in 1675. He entered the society in 1692. He wrote some Latin poems and dramatic pieces; and died in 1741.

PORELLA, in botany, a genus of the natural order of musci and cryptogamia class of plants. The antheræ are multilocular, full of natural pores, with an operculum; there is no calyptra, nor pedicle; the capsules contain a powder like those of the other mosses; and their manner of shedding this powder is not by separating into two parts, like those of the selago and lycopodium, but by opening into several holes on all sides.

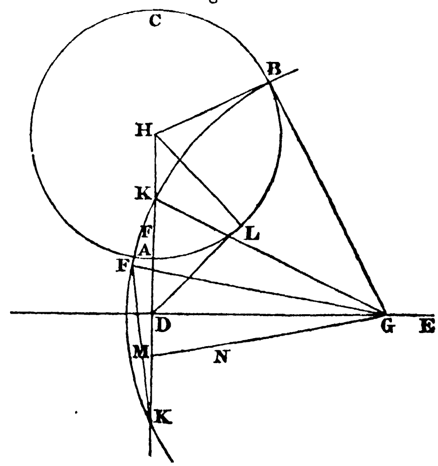
PORISM, in geometry, is a name given by the ancient geometers to two classes of mathematical propositions. Euclid gives it to propositions which are involved in others which he is professedly investigating, and which, although not his principal object, are yet obtained along with it, as is expressed by their name porismata, acquisitions. Such propositions are now called corollaries. But he gives the same name, by way of eminence, to a particular class of propositions which he collected in the course of his researches, and selected from among many others on account of their great subserviency to the business of geometrical investigation. These propositions were so named by him either from the way in which he discovered them, while he was investigating something else, by which means they might be considered as gains or acquisitions, or from their utility in acquiring farther knowledge as steps in the investigation. In this sense they are porismata; for ποριζω signifies both to investigate and to acquire by investigation. These propositions formed a collection which was familiarly known to the ancient geometers by the name of Euclid's porisms; and Pappus of Alexandria says that it was a most ingenious collection of many things conducive to the analysis or solution of the most difficult problems, and which afforded great delight to those who were able to understand and to investigate them. Unfortunately for mathematical science, however, this valuable collection is now lost, and it still remains doubtful in what manner the ancients conducted their researches into this curious subject. We have reason to believe that their method was excellent both in principle and extent; for their analysis led them to many profound discoveries, and was restricted by the severest logic. The best account we have of this class of propositions is a fragment of Pappus, in which he attempts a general definition of them as a set of mathematical propositions distinguishable in kind from all others; but of this distinction nothing remains, except a criticism on a definition of them given by some geometers, and with which he finds fault, as defining them only by an accidental circumstance, 'Porisma est quod deficit hypothesi a theoremate locali.' Pappus then proceeds to give an account of Euclid's porisms; but the enunciations are so extremely defective, while the figure to which they refer is now lost, that Dr. Halley confesses the fragment in question to be beyond his comprehension. The high encomiums given by Pappus to these propositions have excited the curiosity of the greatest geometers of modern times, who have attempted to discover their nature and manner of investigation. M. Fermat, a French mathematician of the seventeenth century, attaching himself to the definition which Pappus criticises, published an introduction (for this is its modest title) to this subject, which many others tried to elucidate in vain. At length Dr. Simson of Glasgow, after patient enquiry, suggested a restoration of the porisms of Euclid, which has all the appearance of being just. It precisely corresponds to Pappus's description of them. All the lemmas, which Pappus has given for the better understanding of Euclid's propositions, are equally applicable to those of Dr. Simson, which are found to differ from local theorems precisely as Pappus affirms those of Euclid to have done. They require a particular mode of analysis, and are of immense service in geometrical investigation; on which account they may justly claim our attention. While Dr. Simson was employed in this enquiry he carried on a correspondence upon the subject with the late Dr. M. Stewart, professor of mathematics in the university of Edinburgh; who, besides entering into Dr. Simson's views, and communicating to him many curious porisms, pursued the same subject in a new and very different direction. He published the result of his enquiries in 1746, under the title of General Theorems, not caring to give them any other name lest he might appear to anticipate the labors of his friend. The greater part of the propositions contained in that work are porisms, without demonstrations; therefore, whoever wishes to investigate one of the most curious subjects in geometry will there find abundance of materials, and an ample field for discussion. Dr. Simson defines a porism to be 'a proposition in which it is proposed to demonstrate that one or more things are given, between which and every one of innumerable other things not given, but assumed according to a given law, a certain relation described in the proposition is shown to take place.' This definition is not a little obscure; it will be plainer expressed thus: 'A porism is a position affirming the possibility of finding such conditions as will render a certain problem indeterminate or capable of innumerable solutions.' This definition agrees with Pappus's idea of these propositions, so far at least as they can be understood from the fragment already mentioned; for the propositions here defined, like those which he describes, are, strictly speaking, neither theorems nor problems, but of an intermediate nature between both; for they neither simply enunciate a truth to be demonstrated, nor propose a question to be resolved, but are affirmations of a truth in which the determination of an unknown quantity is involved. In as far, therefore, as they assert that a certain problem may become indeterminate, they are of the nature of theorems; and, in as far as they seek to discover the conditions by which that is brought about,

they are of the nature of problems. We shall endeavour to make our readers understand this subject distinctly, by considering them in the way in which it is probable they occurred to the ancient geometers: this will at the same time show the nature of the analysis peculiar to them, and their great use in the solution of problems.

It appears to be certain that it has been the solution of problems which, in all states of the mathematical science, has led to the discovery of geometrical truths: the first mathematical enquiries, in particular, must have occurred in the form of questions, where something was given, and something required to be done; and by the reasoning necessary to answer these questions, or to discover the relation between the things given and those to be found, many truths were suggested which came afterwards to be the subject of separate demonstrations. The number of these was the greater, because the ancient geometers always undertook the solution of problems with a scrupulous and minute attention; insomuch that they would scarcely suffer any of the collateral truths to escape their observation. Now as this cautious manner of proceeding gave an opportunity of laying hold of every collateral truth connected with the main object of enquiry, these geometers soon perceived that there were many problems which in certain cases would admit of no solution whatever, in consequence of a particular relation taking place among the quantities which were given. Such problems were said to become impossible; and it was soon found that this always happened when one of the conditions of the problem was inconsistent with the rest. Thus, when it was required to divide a line so that the rectangle contained by its segments might be equal to a given space, it is evident that this was possible only when the given space was less than the square of half the line; for, when it was otherwise, the two conditions defining, the one the magnitude of the line, and the other the rectangle of its segments, were inconsistent with each other. Such cases would occur in the solution of the most simple problems; but, if they were more complicated, it must have been remarked that the constructions would sometimes fail for a reason directly contrary to that just now assigned. Cases would occur where the lines, which by their intersection were to determine the thing sought, instead of intersecting each other as they did commonly, or of not meeting at all as in the abovementioned case of impossibility, would coincide with one another entirely, and of course leave the problem unresolved. It would appear to geometers, upon a little reflection, that since, in the case of determinate problems, the thing required was determined by the intersection of the two lines already mentioned, that is, by the points common to both; so, in the case of their coincidence, as all their parts were in common, every one of these points must give a solution, or, in other words, the solutions must be indefinite in number. Upon enquiry it would be found that this proceeded from some condition of the problem having been involved in another, so that, in fact, there was but one which did not leave a sufficient number of independent conditions to limit the problem to a single or any determinate number of solutions. It would soon be perceived that these cases formed very curious propositions of an intermediate nature between problems and theorems; and that they admitted of being enunciated in a manner peculiarly elegant and concise. It was to such propositions that the ancients gave the name of porisms. This deduction requires to be illustrated by an example; suppose, therefore, that it were required to resolve the following problem:—

A circle A B C, a straight line D E, and a point

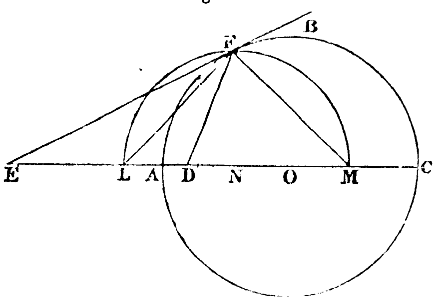
fig. 1.



F, being given in opposition, to find a point G in the straight line D E, such that G F, the line drawn from it to the given point, shall be equal to G B, the line drawn from it touching the given circle. Suppose G to be found, and G B to be drawn touching the given circle A B C in B, let H be its centre, join H B, and let H D be perpendicular to DE. From D draw D L, touching the circle A B C in L and join H L; also from the centre G, with the distance G B or G F, describe the circle B K F, meeting H D in the points K and K′. Then H D and D L are given in position and magnitude; and, because G B touches the circle A B C, H B G is a right angle; and, since G is the centre of the circle B K F, therefore H B touches the circle B K F, and $HB^2 =$ the rectangle K′ H K; which rectangle $+ DK^2 = HD^2$, because K′K is bisected in D; therefore $HL^2 + KD^2 = DH^2 = HL^2$ and $= LD^2$; therefore $DK^2 = DL^2$, and $DK = DL$; and, since D L is given in magnitude, D K is also given, and K is a given point: for the same reason K′ is a given point, and, the point F being given by hypothesis, the B K P is given in position. The point G, the centre of the circle, is therefore given, which was to be found. Hence this construction: having drawn H D perpendicular to D E, and D L touching the circle A B C, make D K and D K′ each equal to D L, and find G the centre of the circle described through the points K′ F K; that is, let F K be joined and bisected at right angles by M N, which meets D E in G; G will be the point required; that is, if G B be drawn touching the circle A B C, and G F to the given point, G B is equal to G F. The synthetical demonstration is easily derived

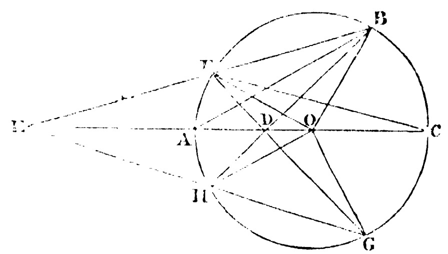
from the preceding analysis; but in some cases this construction fails. For, first, if F fall anywhere in D H, as at F′, the line M N becomes parallel to D E, and the point G is nowhere to be found; or, in other words, it is at an infinite distance from D.—This is true in general; but, if the given point F coincides with K, then M N evidently coincides with D E; so that, agreeable to a remark already made, every point of the line D E may be taken for G, and will satisfy the conditions of the problem; that is to say, G B will be equal to G K, wherever the point G be taken in the line D E: the same is true if F coincide with K. Thus we have an instance of a problem, and that too a very simple one, which, in general, admits but of one solution; but which, in one particular case, when a certain relation takes place among the things given, becomes indefinite, and admits of innumerable solutions. The proposition which results from this case of the problem is a porism, and may be thus enunciated: 'A circle A B C being given by position, and also a straight line D E, which does not cut the circle, a point K may be found, such that if G be any point whatever in D E, the straight line drawn from G to the point K shall be equal to the straight line drawn from G touching the given circle A B C.' The problem which follows appears to have led to the discovery of many porisms. A circle A B C and two points

fig. 2.



D, E, in a diameter of it being given, to find a point F in the circumference of the given circle; from which, if straight lines be drawn to the given points E, D, these straight lines shall have to one another the given ratio of α to β, which is supposed to be that of a greater to a less.—Suppose the problem resolved, and that F is found, so that F E has to F D the given ratio of α to β; produce E F towards B, bisect the angle E F D by F L, and D F B by F M: therefore E L : L D :: E F : F D, that is, in a given ratio; and, since E D is given, each of the segments E L, L D, is given, and the point L is also given because D F B is bisected by F M, E M : M D :: E F : F D, that is, in a given ratio, and therefore M is given. Since D F L is half of D F E, and D F M half of D F B, therefore L F M is half of (D F E + D F B), therefore L F M is a right angle; and, since the points L, M, are given, the point F is in the circumference of a circle described upon L M as a diameter, and therefore given in position. Now the point F is also in the circumference of the given circle A B C, therefore it is in the intersection of the two given circumferences, and therefore is found. Hence, this construction: Divide E D in L, so that E L may be to L D in the given ratio of α to β, and produce E D also to M, so that E M may be to M D in the same given ratio of α to β; bisect L M in N, and from the centre N, with the distance N L, describe the semicircle L F M; and the point F, in which it intersects the circle A B C, is the point required. The synthetical demonstration is easily derived from the preceding analysis. But the construction fails when the circle L F M falls either wholly within or wholly without the circle A B C, so that the circumferences do not intersect; and in these cases the problem cannot be solved. The construction also fails when the two circumferences L F M, A B C, entirely coincide. In this case, every point in the circumference A B C will answer the conditions of the problem, which is therefore capable of numberless solutions, and may, as in the former instances, be converted into a porism. We now enquire, therefore, in what circumstances the point L will coincide with A, and also the point M with C, and of consequence the circumference L F M with A B C. If we suppose that they coincide E A : A D :: α : β :: E C : C D, and E A : E C :: A D : C D, or by conversion E A : A C :: A D : C D—A D :: A D : 2 D O, O being the centre of the circle A B C; therefore, also, E A : A O :: A D : D O and by composition E O : A O :: A O : DO, therefore $EO \times OD = AO^2$. Hence if the given points E and D be so situated that E O

fig. 3.



$\times$ O D = A O², and at the same time α : β :: E A : A D :: E C : C D, the problem admits of numberless solutions; and, if either of the points D or E be given, the other point and also the ratio which will render the problem indeterminate, may be found. Hence we have this porism: 'A circle A B C, and also a point D being given, another point E may be found, such that the two lines inflected from these points to any point in the circumference A B C shall have to each other a given ratio, which ratio is also to be found.' Hence also we have an example of the derivation of porisms from one another; for the circle A B C, and the points D and E remaining as before (fig. 3.), if, through D, we draw any line whatever H D B, meeting the circle in B and H; and if the lines E B, E H, be also drawn, these lines will cut off equal circumferences B F, H G. Let F C be drawn, and it is plain from the foregoing analysis that the angles D F C, C F B, are equal; therefore if O G, O B, be drawn, the angles B O C, C O G, are also equal;

and consequently the angles D O B, D O G. In the same manner, by joining A B, the angle D B E being bisected by B A, it is evident that the angle A O F is equal to A O H, and therefore the angle F O B to H O G, that is, the arch F B to the arch H G. This proposition appears to have been the last but one in the third book of Euclid's Porisms, and the manner of its enunciation in the porismatic form is obvious. The preceding proposition also affords an illustration of the remark, that the conditions of a problem are involved in one another in the porismatic or indefinite case; for here several independent conditions are laid down, by the help of which the problem is to be resolved. Two points D and E are given, from which two lines are to be inflected, and a circumference A B C, in which these lines are to meet, as also a ratio which these lines are to have to each other. These conditions are all independent on one another, so that any one may be changed without any change whatever in the rest. This is true in general; but yet in one case, viz. when the points are so related to one another that their rectangle under their distances from the centre is equal to the square of the radius of the circle, it follows from the preceding analysis, that the ratio of the inflected lines is no longer a matter of choice, but a necessary consequence of this disposition of the points. From all this, we may trace the imperfect definition of a porism which Pappus ascribes to the later geometers, viz. that it differs from a local theorem, by wanting the hypothesis assumed in that theorem. If we take one of the propositions called loci, and make the construction of the figure a part of the hypothesis, we get what was called by the ancient geometers a local theorem. If, again, in the enunciation of the theorem, that part of the hypothesis which contains the construction be suppressed, the proposition thence arising will be a porism; for it will enunciate a truth, and will require to the full understanding and investigation of that truth that something should be found, viz. the circumstances in the construction supposed to be omitted. Thus, when we say, if from two given points E, D (fig. 3), two straight lines E F, F D, are inflected to a third point F, so as to be to one another in a given ratio, the point F is in the circumference of a given circle, we have a locus. But when conversely it is said, if a circle A B C, of which the centre is O, be given by position, as also a point E; and if D be taken in the line E O, so that $EO \times OD = AO^2$; and if from E and D the lines E F, D F, be inflected to any point of the circumference A B C, the ratio of E F to D F will be given, viz. the same with that of E A to A D, we have a local theorem. Lastly, when it is said, if a circle A B C be given by position, and also a point E, a point D may be found, such that if E F, F D, be inflected from E and D to any point F in the circumference A B C, these lines shall have a given ratio to one another, the proposition becomes a porism, and is the same that has just now been investigated. Hence it is evident that the local theorem is changed into a porism, by leaving out what relates to the determination of D, and of the given ratio. But though all propositions formed in this way from the conversion of loci are porisms, yet all porisms are not formed from the conversion of loci; the first, for instance, of the preceding cannot by conversion be changed into a locus; therefore Fermat's idea of porisms, founded upon this circumstance, was imperfect. To confirm the truth of the preceding theory, professor Dr. Stewart, in a paper read many years ago before the Philosophical Society of Edinburgh, defines a porism to be 'A proposition affirming the possibility of finding one or more conditions of an indeterminate theorem;' where, by an indeterminate theorem, he meant one which expresses a relation between certain quantities that are determinate and certain others that are indeterminate; a definition which evidently agrees with the explanations above given. If the idea which is given of these propositions be just, then they are to be discovered by considering those cases in which the construction of a problem fails, in consequence of the lines which by their intersection, or the points which by their position were to determine the problem required, happening to coincide with one another. A porism may therefore be deduced from the problem to which it belongs, just as propositions concerning the maxima and minima of quantities are deduced from the problems of which they form limitations; and such is the most natural and obvious analysis of which this class of propositions admits.

Another general remark may be made on the analysis of porisms: it often happens that the magnitudes required may all, or a part of them, be found by considering the extreme cases; but for the discovery of the relation between them, and the indefinite magnitudes, we must have recourse to the hypothesis of the porism in its most general or indefinite form; and must endeavour so to conduct the reasoning that the indefinite magnitudes may at length totally disappear, and leave a proposition asserting the relation between determinate magnitudes only. For this purpose Dr. Simson frequently employs two statements of the general hypothesis, which he compares together. As, for instance, in his analysis of the last porism, he assumes not only E, any point in the line D E, but also another point O, anywhere in the same line, to both of which he supposes lines to be inflected from the points A, B. This double statement, however, cannot be made without rendering the investigation long and complicated: nor is it even necessary; for it may be avoided by having recourse to simpler porisms, or to loci, or to propositions of the data. A porism may in some cases be so simple as to arise from the mere coincidence of one condition with another, though in no case whatever any inconsistency can take place between them. There are, however, comparatively few porisms so simple in their origin, or that arise from problems where the conditions are but little complicated; for it usually happens that a problem which can become indefinite may also become impossible; and if so the connexion already explained never fails to take place. Another species of impossibility may frequently arise from the porismatic case of a problem which will affect in some measure the application of geometry to astronomy,

or any of the sciences depending on experiment or observation. For, when a problem is to be resolved by help of data furnished by experiment or observation, the first thing to be considered is, whether the data so obtained be sufficient for determining the thing sought; and in this a very erroneous judgment may be formed, if we rest satisfied with a general view of the subject; for, though the problem may in general be resolved from the data with which we are provided, yet these data may be so related to one another in the case under consideration, that the problem will become indeterminate, and, instead of one solution, will admit of an indefinite number. This we have found to be the case in the foregoing propositions. Such cases may not indeed occur in any of the practical applications of geometry; but there is one of the same kind which has actually occurred in astronomy. Sir Isaac Newton, in his Principia, has considered a small part of the orbit of a comet as a straight line described with a uniform motion. From this hypothesis, by means of four observations made at proper intervals of time, the determination of the path of the comet is reduced to this geometrical problem: Four straight lines being given in position, it is required to draw a fifth line across them, so as to be cut by them into three parts, having given ratios to one another. Now this problem had been constructed by Dr. Wallis and Sir Christopher Wren, and also in three different ways by Sir Isaac himself in different parts of his works; yet none of these geometers observed that there was a particular situation of the lines in which the problem admitted of innumerable solutions: and this happens to be the very case in which the problem is applicable to the determination of the comet's path, as was first discovered by the abbé Boscovich, who was led to it by finding that in this way he could never determine the path of a comet with any degree of certainty. Besides the geometrical there is also an algebraical analysis belonging to porisms; which, however, does not belong to this place, because we give this account of them merely as an article of ancient geometry; and the ancients never employed algebra in their investigations. Mr. Playfair, professor of mathematics in the university of Edinburgh, has written a paper on the origin and geometrical investigation of porisms, which is published in the third volume of the Transactions of the Royal Society of Edinburgh, from which this account of the subject is taken. He has there promised a second part to his paper, in which the algebraical investigation of porisms is to be considered. This will no doubt throw considerable light upon the subject, as we may readily judge from that gentleman's known abilities, and from the specimen he has already given us in the first part. For more on this subject, see a very ingenious paper on Porisms by Henry Brougham, esq., in the Philosophical Transactions for 1798, or New Abridgment, vol. xviii. p. 345-355.

PORISMATIC, of or belonging to the mathematical doctrine of porisms.

PORISTIC METHOD, Gr. ποριστικος, in mathematics, is that which determines when, by what means, and how many different ways a problem may be solved.

PORK, *n. s.* PORK'ER, PORK'EATER, PORK'ET, PORK'ING. Fr. *porc*; Lat. *porcus*. Swine flesh unsalted: porker is a hog: porket and porkling a young pig: porkeater is sufficiently plain.

A hovel
Will serve thee in winter, moreover than that,
To shut up thy *porklings* thou meanest to fat.
Tusser.

You are no good member of the commonwealth; for, in converting Jews to Christians, you raise the price of *pork*. *Shakspeare.*

This making of Christians will raise the price of *pork*; if we grow all to be *porkeaters*, we shall not shortly have a rasher on the coals for money.
Id. Merchant of Venice.

A priest appears,
And offrings to the flaming altars bears;
A *porket* and a lamb that never suffered shears.
Dryden

All flesh full of nourishment, as beef and *pork*, increase the matter of phlegm.
Floyer on the Humours.

Strait to the lodgment of his herd he run,
Where the fat *porkers* slept beneath the sun.
Pope.

Thus saith the prophet of the Turk,
Good mussulman abstain from *pork*;
There is a part in every swine,
No friend or follower of mine
May taste. *Cowper.*

PORK. See SUS. The hog is the only domestic animal that we know of no use to man when alive, and therefore seems properly designed for food. The Jews, however, the Egyptians, and other inhabitants of warm countries, and all the Mahometans at present, reject the use of pork. The Greeks gave great commendation to this food, and their Athletæ were fed with it. The Romans considered it as one of their delicacies. With regard to its alkalescency, no proper experiments have yet been made; but, as it is of a gelatinous and succulent nature, it is probably less so than many others. Upon the whole it appears to be a very valuable nutriment. The reason is obvious why it was forbidden to the Jews: their whole ceremonial dispensation was typical. Filth was held as an emblem or type of sin. Hence the many laws respecting frequent washings; and no animal feeds so filthily as swine. Mahomet borrowed this prohibition, as well as circumcision and many other parts of his system, from the law of Moses. But it is absurd to suppose, as some do, that Moses borrowed any thing of this kind from the Egyptians.

PORO ISLE, an island on the south-western coast of Sumatra, north-west of the Poggy Islands, and inhabited by a similar race of people. It is also denominated Pulo Siporah, or Good Fortune Island, and contains four villages, in which there are about 1000 inhabitants. In length this island is estimated at thirty-three miles, by eight the average breadth; and described as being covered with wood. Long. 99° 15′ E., lat. 2° 12′ S.

POROMPHALON, in medicine, from πωρος, a callus, and ομφαλος, the navel, a hard piece of flesh or stone growing out from the navel.

POROMUSHIR, the second of the Kurile islands, in the North Pacific, is about forty-four miles in length, and twelve in breadth. The

northern part is mountainous, the south-west diversified by hills and valleys; and there is a chain of mountains on the island, never free of snow. This island is said to be abundant in minerals, wolves, and red foxes, but destitute of timber. There is a large bay at the south-east extremity. The most southern point is Cape Wasilieff, in lon. 156° 14′ E., lat. 51° 38′ N.

POROS, a small rocky island in the gulf of Egina, Greece, separated from the coast of Argolis by a narrow channel. It was the ancient Sphœria, remarkable for its rocks of granite, and having a considerable maritime trade. The isle of Calauria is joined to Poros by a sand-bank.

POROSIS, in medicine, πωρωσις, the breeding of callous or hard matter.

POROSITY, an essential property of bodies, is best ascertained by the microscope, which shows us the passage of fluids through solid bodies; or we may discover this property in the transmission of light, in all directions, through the internal structure of hard and solid bodies. The porosity of wood is very remarkable. Air may be blown by the mouth, in a profuse stream, through a cylinder two feet long of dried oak, beech, elm, or birch; and if a piece of wood, or a piece of marble, be dipped in water, and submitted to experiment under the receiver of a pneumatic machine, the air issuing through the exterior cavities will appear in a torrent of bubbles on the external surface. In like manner mercury is forced through a piece of dry wood, and made to fall in the form of a fine divided shower. If a few ounces be tied in a bag of sheep skin, it may be squeezed through the leather by the pressure of the hand, in numerous minute streamlets. This experiment illustrates the porosity of the human cuticle. From microscopic observations, it has been computed that the skin is perforated by a thousand holes in the length of an inch. If we estimate the whole surface of the body of a middle-sized man to be sixteen square feet, it must contain no fewer than 2,304,000 pores. These pores are the mouths of so many excretory vessels, which perform that important function in the animal economy, *insensible perspiration.* The lungs discharge, every minute, six grains, and the surface of the skin from three to twenty grains, the average over the whole body being fifteen grains of lymph, consisting of water, with a very minute admixture of salt, acetic acid, and a trace of iron. If we suppose this perspirable matter to consist of globules only ten times smaller than the red particles of blood, or about the 5000th part of an inch in diameter, it would require a succession of 400 of them to issue from each orifice every second. The permeability of a solid body to any fluid, depends, however, on its peculiar structure and its relation to the fluid. A compact substance will sometimes oppose the entrance of thin fluid, while it gives free passage to a gross one. Thus a cask, which holds water, will permit oil to ooze through it; and a fresh, humid bladder, which is air-tight, will yet, when pressed under water, imbibe much of that liquid. If a cylindrical piece of oak, ash, elm, or other hard wood, cut in the direction of its fibres, be cemented to the end of a long glass tube, water will pass freely through it, in divided streamlets; but a soft cork, inserted into a similar tube, will effectually prevent all escape of the liquid. Mercury may be carried in a small cambric bag, which could not retain water for a moment. If a circular bottom of close-grained wood, divided by a fine slit (from the 30th to the 100th part of an inch wide), be cemented to the end of a glass tube, it will support a column of mercury from one to three or more inches high, the elevation being always proportional to the narrowness of the slit. Hence a cistern of box-wood is frequently used for portable barometers, the fine joints admitting the access and pressure of the air, but preventing the escape of the mercury. Yet a sufficient force would overcome this obstruction; and, in the same manner, the air which is confined in the common bellows under a moderate pressure, might, by a more violent action, be made to transpire copiously through the boards and the leather. The transmission of a fluid through a solid substance shows the existence of pores; but the resistance, in ordinary cases, to such a passage, is insufficient, therefore, to prove the contrary. The permeability of translucent substances to the rays of light, in all directions, evinces the most extreme porosity. But this inference is not confined merely to the bodies usually termed *diaphanous;* for the gradation towards opacity advances by insensible shades. The thin air itself is not perfectly translucid, nor will the densest metal absolutely bar all passage of light. The whole mass of our atmosphere, equal to the weight of a column of thirty-four feet of water, transmits, according to its comparative clearness, only from four-fifths to three-fourths of the perpendicular light, and consequently retains or absorbs from a fifth to a fourth of the whole. But this absorption is greatly increased by the accumulation of the medium. When the sun has approached within a degree of the horizon, and his rays now traverse a tract of air equal in weight to a column of 905 feet of water, only the 212th part of them can reach the surface of the earth. Even gold itself is diaphanous: if a leaf of that metal, either pure or with only an 80th part of alloy, and therefore of a fine yellow lustre, but scarcely exceeding the 300,000th part of an inch in thickness, and enclosed between two thin plates of mica, be held immediately before the eye, and opposite to a window, it will transmit a soft green light, like the color of the water of the sea, or of a clear lake of moderate depth. The inferior ductility of the other metals will not allow that fine lamination, which would be requisite for showing, in ordinary cases, the transmission of light. But their diaphanous quality might be inferred from the tints with which they affect the transmitted rays, on being alloyed with gold. Other substances, though commonly reckoned opaque, yet admit, in various degrees, the passage of light. The window of a small apartment being closed by a deal board, if a person within shut his eyes a few minutes to render them more acute, he will, on opening them again, easily discern a faint glimmer issuing through the win-

dow. In proportion as the board is planed thinner, more light will be admitted, till the furniture of the room becomes visible. Writing paper transmits about one third part of the whole incident light, and when oiled, it often supplies the place of glass in the common workshops. The addition of oil, does not, however, materially augment the diaphanous quality of the paper, but renders its internal structure more regular, and more assimilated to that of a liquid. The rays of light travel, without much obstruction, across several folds of paper, and even escape copiously through pasteboard. Combining these various facts, it follows that all bodies are permeable, though in extremely different degrees, to the afflux of light. They must, therefore, be widely perforated, and in every possible direction.

PORPHYRIUS, a famous Platonic philosopher, born at Tyre in 233, in the reign of Alexander Severus. He was the disciple of Longinus, and became the ornament of his school at Athens; thence he went to Rome, and attended Plotinus, with whom he lived six years. After Plotinus's death he taught philosophy at Rome with great applause; and became well skilled in polite literature, geography, astronomy, and music. He lived to the end of the third century, and died in the reign of Diocletian. There are still extant his book on the Categories of Aristotle; a Treatise on Abstinence from Flesh; and several other pieces in Greek. They were printed at Cambridge in 1655, 8vo., with a Latin version. He also composed a large treatise against the Christian religion, which is lost. It was answered by Methodius, Eusebius, St. Jerome, &c. The emperor Theodosius the Great caused it to be burnt in 338.

POR'PHYRE, *n. s.* } From Fr. *porphyre*;
POR'PHYRY. } Gr. *πορφυρα*; Lat. *porphyrites*. Marble of a particular kind.

PORPHYRY, in the old system of mineralogy, was a genus of stones ranking in the order of saxa. It is found of several different colors, as green, deep red, purple, black, dark brown, and grey. The porphyry of the ancients is a most elegant mass of an extremely fine and compact structure, remarkably heavy, and of a fine strong purple, variegated more or less with pale red and white; its purple is of all degrees, from the claret color to that of the violet; and its variegations are rarely disposed in veins, but spots, sometimes very small, and at others running into large blotches. It is less fine than many of the ordinary marbles; but it excels them all in hardness, and is capable of a most elegant polish. It is still found in immense strata in Egypt. The hard red-lead colored porphyry, variegated with black, white, and green, is a most beautiful and valuable substance. It has the hardness and all the other characters of the oriental porphyry, and even greatly excels it in brightness, beauty, and variegation of colors. It is found in great plenty in Minorca. The hard, pale-red porphyry, variegated with black, white, and green, is of a pale flesh color, often approaching to white. It is variegated in blotches from half an inch to an inch broad. It takes a high polish, and emulates all the qualities of the oriental porphyry. It is found in immense strata in Arabia Petræa and in the Upper Egypt; and in separate nodules in Germany, England, and Ireland.

There are three famous obelisks of porphyry at Cairo, and two at Alexandria, called Cleopatra's needles. The art of cutting porphyry, practised by the ancients, appears now to be lost, as modern tools will scarcely touch it. Yet in the palace of the Thuilleries there are, or at least were, busts of Apollo and twelve emperors. Mr. Addison says he saw a workman at Rome cutting porphyry; but his advances were extremely slow, and almost insensible. The Italian sculptors work the pieces of old porphyry columns still remaining (for the porphyry quarries are long since lost) with a brass saw without teeth. With this saw, emery, and water, they rub and wear the stone with great patience. Many persons have endeavoured to retrieve the ancient art, and particularly Leon Baptist Alberti; who, searching for the necessary materials for temper, says he found goats' blood the best of any: but even this availed not much; for, in working with chisels tempered with it, sparks of fire came much more plentifully than pieces of stone. The sculptors were thus, however, able to make a flat or oval form; but could never attain to any thing like a figure. In 1555 Cosmo de Medicis is said to have distilled a water from certain herbs with which his sculptor, Francis Tadda, gave his tools such an admirable hardness, and so fine a temper, that he performed some very exquisite works with them; particularly our Saviour's head in demi-relievo, and Cosmo's head and his duchess's. The very hair and beard were well conducted; but the secret appears to have died with him. The French have discovered another mode of cutting porphyry, *viz.* with an iron saw without teeth, and grez, a kind of free-stone pulverised, and water. The authors of this invention say that they could form the whole contour of a column hereby, if they had matter to work on. Others have proposed to harden tools so as to cut porphyry by steeping them in the juice of the plant called bear's breech or brankursine. Mr. Boyle says that he caused porphyry to be cut by means of emery, steel saws, and water. See his Works, abr. vol. i. p. 111. Da Costa supposes that the method used by the ancients in cutting and engraving porphyry was with numbers of common tools at great expense; that they rudely hewed or broke the stone into the intended figure, and by continued application reduced them into more regular designs; and that they completed the work by polishing it with great labor, by particular hard sands found in Egypt. And he thinks that in the porphyry quarries there were layers of grit, or loose disunited particles, analogous to the porphyry, which they carefully sought for and used for this work. See Natural History of Fossils, p. 285.

Porphyry is defined by Dr. Ure as a compound rock, having a basis, in which the other contemporaneous constituent parts are imbedded. The base is sometimes claystone, sometimes hornstone, sometimes compact feldspar; or pitchstone, pearlstone, and obsidian. The imbedded parts are most commonly feldspar and quartz,

which are usually crystallized more or less perfectly, and hence they appear sometimes granular. According to Werner there are two distinct porphyry formations; the oldest occurs in Athole and Dalnacardoch, there is a very fine example of a bed of porphyry-slate in mica. The second porphyry formation is much more widely extended. It consists principally of clay porphyry, while the former consists chiefly of hornstone porphyry and feldspar porphyry. It sometimes contains considerable repositories of ore, in veins. Gold, silver, lead, tin, copper, iron, and manganese occur in it; but chiefly in the newer porphyry, as happens with the Hungarian mines. It occurs in Arran, and in Perthshire between Dalnacardoch and Tummel-bridge.

'The columns of porphyry at Rome,' observes a writer in Dr. Brewster's Journal, 'are not nearly of so large a size as the large columns of granite. The urn of Constanza and the urn of Helena are each composed of a very large block of porphyry; and the great tazza or saucer-shaped reservoir in the rotunda of the Museo Pio-Clementino is of one great piece of porphyry. Pliny says that sculptors began to work in porphyry only in the reign of Claudius. Vopiscus mentions porphyry. The room in which the princes of the Greek empire were born was incrusted with porphyry, and the princes born in this room were called Porphyrogeneti. The name porphyry, or purple, applied to this stone, was taken from the ancient purple dye, made of the shell-fish called porphyrios, which was got near Tyre. It is, therefore, supposed that the ancient dye was of the dull red color which this stone exhibits. A small grained greenish porphyry is sometimes found, but much more rarely than the red porphyry, amongst the remains of ancient art at Rome; it is quite different from the antique green serpentine.

PORPITES, the hair-button stone, in natural history, a name given by authors to a small species of fossil coral; which is usually of a rounded figure, considerably flatted, and striated from the centre every way to the circumference. These are of different sizes, and of different colors, as greyish, whitish, brownish, or bluish, and are usually found immersed in stone.

POR'POISE, *n. s.* } Fr. *porc poisson.* The
POR'PUS. } sea-hog.

PORPOISE, CAPE, a cape of North America, on the coast of York county, Maine, seven leagues north by east of cape Neddock, and five south-west of Wood Island. It is known by the high lands of Kennebunk, on its north-west quarter. A vessel that draws ten feet will be aground at low water in the harbour, and it is so narrow that a vessel cannot turn. It is within 100 yards of the sea, and secure from all winds. Long. 70° 23′ W., lat. 43° 22′ N.

PORRA'CEOUS, *adj.* Fr. *porrace;* Latin *porraceous.* Greenish.

POR'RET, *n. s.* Lat. *porrum.* A scallion.

It is not an easy problem to resolve why garlick, molys and *porrets* have white roots, deep green leaves, and black seeds. *Browne.*

POR'RIDGE, *n. s.* } More properly por-
POR'RINGER, *n. s.* } rage; barb. Lat. *porrata,* from porrum, a leek. Food made by boiling meat in water; broth: a vessel in which broth is eaten.

PORSENNA, a king of Etruria, contemporary with Tarquin II. king of Rome, whom he endeavoured to restore after his banishment, and fought against the Roman republicans at first with such success that he laid siege to Rome, but the courage of Cocles and Scævola obliged him to retire. See ROME, and MUTIUS.

PORSON (Richard), a late eminent Greek scholar, was born at East Ruston, in Norfolk, on Christmas-day, 1759. His father was in the humble condition of a parish clerk; but he was a man of great natural vigor of mind. To his father's care and direction in the commencement of his education, and particularly to his mode of cultivating the faculty of memory, this eminent linguist owed many of the high attainments which he afterwards made. By his father's aid he made a considerable progress in writing and mathematical calculations before he had completed his ninth year, and from that period till he was twelve he was placed under the village schoolmaster, of the name of Summers. Porson derived his first instruction in classical learning from the rector of the parish, Mr. Hewitt. When he had passed the age of fourteen it was thought necessary to send him to a public school; and the means were chiefly supplied by the late Mr. Norris. In August 1774 he went, therefore, to Eton, with a temporary provision of £80 a year. He was from thence removed to Trinity College, Cambridge, in the end of 1777. For a time he devoted himself to the study of mathematics; but he shortly after devoted himself entirely to classical literature. In 1781 he was elected by the vice-chancellor, the five regius professors, and the public orator, to a Craven scholarship. In 1782 he obtained a gold medal for his classical proficiency; and when he took his bachelor's degree he stood in the list of senior optimes. He was soon after elected a fellow of Trinity College, and took his master's degree in 1785. By the statutes he was obliged, in seven years after, either to take orders, and proceed bachelor of divinity, or to lose his fellowship. Having unfortunately imbibed Socinian opinions, he came to the honourable resolution, in 1791, of resigning. The college and university have been much blamed for driving from their bosom such a man, but without reason: the statutes leave no alternative. He was, however, recalled in 1792, in the most creditable manner, to succeed W. Cooke, M. A. of King's College, as Greek professor. In 1795 he married Mrs. Lunan, a sister of Mr. Perry, editor of the Morning Chronicle, to which paper Porson was a frequent contributor. He was afterwards appointed principal librarian of the London Institution, and resided chiefly at their house in the city, where he died. In 1785 he added notes to a new edition of Xenophon's Anabasis, originally edited at Oxford by Hutchinson. In 1790 he added Notæ breves ad Toupii Emendationes in Suidam, and Notæ in curas Novissimas, to a new Oxford edition of Emendationes in Suidam et Hesychium, et alios Lexicographos Græcos. In the same year he published with his name, Letters to Mr. Archdeacon Travis, in answer to his defence of

the Three Heavenly Witnesses, &c., written certainly with great spirit, learning, and wit, but perhaps with too little respect for his learned adversary. In 1793 he corrected the press of a new edition of Heyne's Virgil, wrote a short preface, and added a few conjectural criticisms, &c. Porson possessed a copy of Pauw's edition of Æschylus, corrected throughout by himself. Having lent it to a friend, a surreptitious edition was published. Schultz printed another in Germany, adding, with just respect and admiration, the corrections and new readings of Porson. In 1797 he published the Hecuba of Euripides, in 1 vol. 8vo., with many emendations from MSS., notes, and a learned vindication.

A MS. copy of the Lexicon of Photius, patriarch of Constantinople in 857, &c., belongs to Trinity College. On the transcription of this valuable remnant for the press from the original, which had become nearly obliterated, the professor bestowed the labor of ten months, which, after all, was lost by an accidental fire at Merton, in Surry. Fortunately he himself was absent, and had the original with him. He lost a play of Æschylus, ready for the press, in the same fire. It is a singular proof of Porson's industry, that he sat down, without a murmur, and made a new transcript of the patriarch's Lexicon, equal, it is said, in correctness, to a fac simile. In spring 1797 his wife died of a consumption. He had himself narrowly escaped this fatal disease in his early youth; and after his wife's death was incessantly afflicted with spasmodic asthma for nearly twelve years, which doubtless deprived the world of many rich fruits of his learning. In September 1808, having experienced for some time a general debility, he feil into an intermittent fever, which was succeeded by two successive strokes of apoplexy, on the 19th and 20th of that month. He languished after this till Sunday the 25th, when he expired without a struggle. His body was removed from the London Institution to Cambridge, where he was buried in the chapel of Trinity College, on Tuesday the 4th of October, with every mark of honor which the college could confer. His tracts and miscellaneous criticisms have been published by Mr. Kidd.

PORT', *n. s.*
PORT'AGE,
POR'TAL,
PORTCUL'LIS, *n. s.* & *v. a.*
} Sax. porte; Fr. *porte*; Lat. *porta*. A gate: the aperture of a ship at which a gun is put out: portage is an obsolete word for port-hole: portal, a gate or gate-way: portcullis, a military defence of a gate.

> Though I should run
> To those disclosing *portals* of the sun;
> And walk his way, until his horses steep
> Their fiery locks in the Iberian deep. *Sandys.*

> Over it a fair *portcullis* hong,
> Which to the gate directly did incline,
> With comely compass and compacture strong,
> Neither unseemly short, nor yet exceeding long. *Spenser.*

PORT', *n. s.* & *v. a.*
PORT'AGE, *n. s.*
PORT'ANCE,
PORT'LY, *adj.*
PORT'LINESS, *n. s.*
} Fr. *portée*; Lat. *porto*. Carriage; air; mien; manner; bearing; external appearance: to carry in form: portage is the price of carriage: portly is, grand or great of mien: portliness and portance corresponding.

> In that proud *port*, which her so goodly graceth,
> Whiles her fair face she rears up to the sky,
> And to the ground her eyelids low embraceth,
> Most godly temperature ye may descry. *Spenser.*

> There steppeth forth a goodly lady,
> That seemed to be a woman of great worth,
> And by her stately *portance* born of heavenly birth. *Id.*

> Rudely thou wrong'st my dear heart's desire,
> In finding fault with her too *portly* pride. *Id.*

> Such pride his praise, such *portliness* his honour,
> That boldness innocence bears in her eyes;
> And her fair countenance like a goodly banner
> Spreads in defiance of all enemies. *Id.*

> Think you much to pay two thousand crowns,
> And bear the name and *port* of gentleman? *Shakspeare.*

> Your loves,
> Thinking upon his services, took from you
> The apprehension of his present *portance*,
> Which gibingly, ungravely, he did fashion. *Id.*

> A goodly, *portly* man, and a corpulent; of a cheerful look, a pleasing eye, and a most noble carriage. *Id.*

> Our house little deserves
> The scourge of greatness to be used on it;
> And that same greatness too, which our own hands
> Have helped to make so *portly*. *Id.*

> When substantialness combineth with delightfulness, fulness with fineness, seemliness with *portliness*, and currentness with stayedness, how can the language sound other than most full of sweetness? *Camden's Remains.*

A PORT, harbour, or haven, is formed either by nature or art to receive and shelter shipping from the storms and waves of the open sea. Artificial ports are those which are either formed by throwing a strong mound or rampire across the harbour's mouth to some island or rock, or erecting two long barriers, which stretch from the land on each side like arms, or the horns of a crescent, and nearly enclose the haven; the former of these are called mole-heads, and the latter piers.

PORT is also a name given on some occasions to the larboard or left side of the ship, as in the following instances. Thus it is said, the ship heels to port, i. e stoops or inclines to the larboard side. Top the yard to port! the order to make the larboard extremity of a yard higher than the other. Port the helm! the order to put the helm over to the larboard side of the vessel. In all these senses this phrase appears intended to prevent any mistakes happening from the similarity of sounds in the words starboard and larboard, particularly when they relate to the helm, where a misapprehension might be attended with very dangerous consequences.

PORT is also a strong wine brought from Porto or Oporto.

PORT, in music, or PORT OF THE VOICE, the faculty or habit of making the shakes, passages, and diminution, in which the beauty of a song or piece of music consists.

PORT, in ships of war, the embrasure or opening in the side of a ship of war, wherein the

artillery is ranged in battery upon the decks above and below. The ports are formed of a sufficient extent to point and fire the cannon, without injuring the ship's side by the recoil; and, as it serves no end to enlarge them beyond what is necessary for that purpose, the shipwrights have established certain dimensions by which they are cut in proportion to the size of the cannon. The ports are shut in at sea by a sort of hanging doors called the port lids; which are fastened by hinges to their upper edges, so as to let down when the cannon are drawn into the ship. Thus the water is prevented from entering the lower deck in a turbulent sea. The lower and upper edges of the ports are always parallel to the decks, so that the guns, when levelled in their carriages, are all equally high above the lower extremity of the ports, which is called the port-cells.

Port, in geography, makes part of the names, both distinct and compounded, of a great number of bays, harbours, and sea port towns, in various places of the world. The principal of these, not elsewhere described by us, will be found below.

Port Dalrymple is a harbour or estuary on the north coast of Van Diemen's Land, into which the Tamar discharges itself, after receiving the North and South Esk rivers. At the union of the latter the Tamar is navigable by vessels of 150 tons. Kangaroos are found in numbers; ducks of various kinds, and black swans. A British settlement was sent out from Port Jackson, and established at Port Dalrymple, in 1804. An animal described as a species of striped hyæna, but most probably of the opossum genus, is found here. It is said to have a remarkably large mouth, and to be very voracious.

Port Discovery is a harbour on the north-west coast of America, in the gulf of Georgia, a little to the east of New Dungeness. It received its name from the ship commanded by Vancouver, in May 1792, who found here, in thirty-four fathoms water, a muddy bottom, about a quarter of a mile from the shore. The entrance of the harbour is formed by low projecting points, extending on each side, from high woodland cliffs. A stream of water, near the ship's station, appeared to have its source at some distance. A few shrubs, that seemed to thrive luxuriantly, such as roses, sweetbriar, gooseberries, raspberries, currants, and other smaller bushes, were the vegetable productions. A few of the natives, in canoes, brought with them for sale some fish and venison. In their persons, canoes, and arms, these people resembled the inhabitants of Nootka, but were more cleanly. They wore ornaments in their ears; and some of them understood a few words of the Nootka language. They were clothed in deer and bear skins, well wrought; and, what was felt extraordinary, offered for sale, for some copper, two children, each about six or seven years of age. The entrance of the port is, in long. 237° 20′ E., lat. 48° 7′ N.

Port Egmont is a large and convenient harbour on the north-west coast of Falkland's Islands, discovered by Byron in the year 1765, and so named in honor of lord Egmont, then first lord of the admiralty. The mouth of it is south-east, twenty-one miles from a low rocky island, which is a good sea-mark. Within the island, at the distance of about two miles from the shore, are between seventeen and eighteen fathoms water; and, about nine miles to the west of the harbour, there is a remarkable white sandy beach, off which a ship may anchor. The whole navy of England, it is said, might ride here in perfect security; and here is abundance of fresh water, but wood is wanting. Commodore Byron took possession of the port, and all the islands, in 1765, in the name of George III. king of Great Britain. Long. 55° W., lat. 51° 27′ S.

Port Etches, a bay or harbour on the south-west of Hinchinbrook Island, where the Russians have a factory, at the entrance of Prince William's Sound. At first, by way of security, a galliot of about seventy tons burden was drawn ashore, and formed nearly one side of a square, within which houses were built: on the decks were some swivels and carriage-guns well mounted. Long. 213° 56′ E., lat. 60° 21′ N.

Port Francais, a bay or harbour on the west coast of North America, discovered by La Perouse, in the year 1786. 'The sea,' says he, 'rises here seven feet and a half at full and change of the moon; it is high-water at one o'clock. The sea breezes, or perhaps other causes, act so powerfully upon the current of the channel, that I have seen the flood come in there like the most rapid river; and in other circumstances, though at the same periods of the moon, it may be stemmed by a boat. I have, in my different excursions, found the high-water mark to be fifteen feet above the surface of the sea. These tides are probably incident to the bad season. When the winds blow with violence from the southward, the channel must be impracticable, and at all times the currents render the entrance difficult. The going out of it also requires a combination of circumstances, which may retard the departure of a vessel many weeks. There is no getting under weigh, but at the top of high-water; the breeze from the west to the north-west does not often rise till towards eleven o'clock, which does not permit the taking advantage of the morning tide; finally, the easterly winds, which are contrary, appear to me to be more frequent than those from the west; and the vast height of the surrounding mountains never permits the land breezes, or those from the north, to penetrate into the road. As this port possesses great advantages, I thought it a duty incumbent on me to make its inconveniences also known. The climate of this coast seemed to me to be infinitely milder than that of Hudson's Bay, in the same degree of latitude. W measured pines of six feet diameter, and 14 feet high. Vegetation is also very vigorous during three or four months of the year. should not be in the least surprised to see Russian corn, and a great many common plants, thrive there exceedingly well. We found great abundance of celery, round-leaved sorrel, lupines, the wild-pea, yarrow, and endive. The woods abound in gooseberries, raspberries, and strawberries; clusters of elder-trees, the dwarf-willow, different species of briar, which grow in the shade, the gum-poplar tree, the poplar, the sal-

low, the horn-beam; and, finally, superb pines, fit for the masts of our largest ships. Not any of the vegetable productions of this country are unknown in Europe. The rivers are filled with trout, salmon, and other fish. In the woods our hunters met with bears, martins, and squirrels; and the Indians sold us skins of the brown and the black bear, of the Canadian lynx, ermine, martin, little gray squirrel, beaver, Canadian marmot, or monax, and the red fox. We saw tanned skins of the original or elk, and a horn of a wild goat; but the commonest and most precious peltry is that of the sea otter, wolf, and bear. The sides of the harbour are formed by secondary mountains, whose elevation is from 800 to 900 toises. They are covered with pines and verdure, and the snow is only seen on their summits. In the valleys are found specimens of every thing which forms the mass of the mountains, ochre, coppery pyrites, garnets, brittle, but very large and perfectly crystallised, schorle in crystal, granite, schisti, hornstone, very pure quartz, mica, plumbago, and coals. Some of these substances prove that these mountains contain copper and iron ores, but we saw not the least trace of any other metals. The inhabitants appeared to be similar in their habits to those generally found on the coast of North America. They were cruel, deceitful, addicted to quarrelling, and in their domestic habits filthy to an extreme. Long. 137° 10′ W., lat. 58° 37′ N.

Port Frederick, a harbour on the north side of King George the Third's archipelago. Long. 224° 40′ E., lat. 58° 12′ N.

Port Jackson, a harbour and English settlement on the east coast of New Holland. Into the entrance, between two ship heads, distant from each other one mile and three-quarters, ships may run safely; there is nothing in the way. It may be entered and departed from in all winds. Within, the port divides into two branches, one stretching sixteen miles west, and the other seven miles north-west, both containing numerous creeks, on one of which the town of Sydney, the chief of Botany Bay, is situated. See Holland, New. Long. of Cattle Point 151° 11′ 49″ E., lat. 33° 51′ 45″ S.

Port Louis, called also, during the revolution, Port de la Liberté, a sea-port of France, in the department of the Morbihan, on the extremity of a peninsula, at the mouth of the river Blavet, is strongly fortified, and defended by a citadel built on an insulated rock on the north-west of the town. It was founded by Louis XIII., and is supposed to stand near the site of the ancient Blavia. Population 2700, whose chief traffic is in the fisheries. Four miles south by east of L'Orient.

Port Louis, the capital of Mauritius, or the Isle of France, in the Indian Sea. It is situated in a low and flat valley, on the west of the island, surrounded by mountains, and covered with rocks and stones, which render the roads rough and irregular; but the streets have been of late carefully levelled. Excellent water is supplied from a river about a league off, whence a canal leads it to the foot of a high mountain at the western extremity of the place. Here boats come and fill their barrels from a large reservoir. The houses of the town are built chiefly of wood, on a foundation of rough stone and lime. The quays are commodious; and there is a great basin for the purpose of repairing vessels. A guard-house is erected on the summit of the mountain at the western extremity of the town, where, in the night-time, a light is kindled. In 1817 Port Louis was almost entirely burnt to the ground. See the article Mauritius. Long. 57° 32′ E., lat. 20° 10′ S.

Port Macquarrie, an inlet on the east coast of New Holland, into which the River Hastings falls. It was surveyed by Mr. Oxley in 1818, who gave it its present appellation. Long. 152° 53′ 54″ E., lat. 31° 25′ 45″ S.

Port Mahon, a sea-port of Minorca, and the chief place of a district, is surrounded by the sea, east, south, and west. It is built chiefly on rocks, hollowed out beneath by the water, which, in the course of time, will render the situation dangerous. The houses are in general good; but the streets are uneven, rough, and badly paved. The place d'armes is square, large, and handsome: on one side are barracks for 1200 men. The alameyda, an alley of trees, is the only public walk. This town was founded by Mago the Carthaginian, and afterwards surrounded with a Moorish wall; but of this there are no remains except a gate. The harbour, at its entrance, has some shoals, but in the inside it is one of the safest and most convenient in the Mediterranean. On one side is a dock-yard, and on the other a natural mole. It contains four small islands, on one of which there is a neat hospital, built by the English. On taking it, in 1798, they erected a number of telegraphs, and planned additional fortifications here; but the Spaniards, on recovering it in 1802, demolished almost all that had been done. Long. 4° 5′ E., lat. 36° 17′ N.

Port Mulgrave, or Admiralty Bay, is a harbour on the west coast of North America, formed by islands on the east side of Behring's Bay, near the entrance; it was so named by captain Dixon, in honor of lord Mulgrave; though visited before by Chitrow, master of the Russian fleet, under Behring. Here Dixon saw some of the natives, whose wretched hovels were a complete picture of filth and idleness. Long. 220° 35′ E., lat. 59° 34′ N.

Port Orchard, a bay or harbour within Admiralty Inlet, so called from a gentleman in Vancouver's vessel, who discovered it in the year 1792. Long. 237° 36′ E., lat. 47° 39′ N.

Port au Prince, a sea-port on the west coast of the island of Hispaniola. The environs produce cotton, indigo, sugar, and coffee. In 1770 great part of this town was destroyed by an earthquake: in 1791 it was set on fire, and great part of it burned down; and, in the year 1794, it was taken by the English. Except in time of war it was formerly the capital of the French part of Hispaniola. In 1790 it consisted of about 600 houses, and contained 2754 white inhabitants. The situation is marshy, and the climate unhealthy: both the hills, however, which command the town and harbour, and the valleys, are abundantly fertile. To the east is the plain of Cul de Sac, extending from thirty to forty miles in length, by nine in breadth; and con-

taining 150 sugar plantations, most of which are capable of being watered, in times of drought, by canals, admirably contrived. Long. 73° 10′ W., lat. 18° 35′ N.

Port Resolution, a harbour north of the most easterly point of the Island of Tanna, one of the New Hebrides, discovered by captain Cook in 1774. The depth of water here is from six to three fathoms, and the bottom is sand and mud. No place can be more convenient for taking in wood and water; but a shoal of sand and rocks lying on the east side makes it narrow. Long. 169° 45′ E., lat. 19° 32′ S.

Port Royal, a sea-port of Jamaica, situated on a narrow neck of land on the south side of the island. Here 1000 sail of ships could anchor with convenience; and the water was so deep at the quay that vessels of the greatest burden could lay their broadsides to the wharfs, and load or unload with little trouble. It contained 2000 houses, handsomely built; and few places in the world exceeded it for trade, wealth, and dissoluteness of manners—till the 9th of June 1692, when a dreadful earthquake, which seemed to shake the foundations of the island, overwhelmed Port Royal, and buried nine-tenths of it eight fathoms under water: about ten years after, the town having been partially rebuilt, it was laid in ashes by a terrible fire. Still the extraordinary convenience of the harbour tempted them to rebuild; but, in the year 1722, a most dreadful hurricane reduced this place a third time to a heap of rubbish. The custom-house and public offices were now removed, and no market suffered to be held here for the future. It is therefore reduced to two or three streets, a few lanes, and about 200 houses. It contains, however, the royal navy-yard, navy hospital, and barracks for a regiment of soldiers. The fortifications are also kept in excellent order. Twenty miles south-west of Kingston.

Port Royal, a post town of Caroline county, Virginia, on the Rappahannock; twenty miles south-east of Fredericksburgh, west, eighty. It was once a place of considerable trade, but is now in a state of decay. Rappahannock Academy is situated about two miles west of the town. It has some funds, and a respectable library. Also a post-town of Montgomery county, Tennessee, at the union of the Sulphur Fork and Red River; twelve miles east of Clarksville.

Port Royal Island, an island in Port Royal Entrance, near the coast of South Carolina, about twelve miles long, and five wide. Beaufort is the principal town. Lat. 32° 12′ N.

Port St. Juan, a bay or harbour on the south-west coast of the Island of Quadra and Vancouver, at the entrance of the straits of Juan de Fuca. Long. 235° 52′ E., lat. 48° 32′ N.

Port St. Julian, a harbour of the Atlantic, on the east coast of Patagonia, discovered by Magellan in April 1520. Here a mutiny arose, which was quelled by the resolution of the admiral, and the authors punished. He staid here two months, finding plenty of fish, wood, and water. Here were first seen the large inhabitants, named Patagonians by this navigator. Long. 68° 44′ W., lat. 49° 10′ S.

Port Sandwich, a harbour of the Island of Mallicollo, in the South Pacific. Captain Cook says, the night before we came out of Port Sandwich two reddish fish, about the size of a large bream, and not unlike them, were caught with hook and line. On these fish most of the officers, and some of the petty officers, dined the next day. The night following, every one who had eaten of them was seized with violent pains in the head and bones, attended with a scorching heat all over the skin, and numbness in the joints. There remained no doubt that this was occasioned by the fish being of a poisonous nature, and having communicated its bad effects to all who partook of them, even to the hogs and dogs. One of the former died; and, not long after, one of the latter shared the same fate, in about sixteen hours. It was a week or ten days before all the gentlemen recovered. Long. 167° 57′ E., lat. 16° 25′ S.

Port Tobacco, a post-town and capital of Charles county, Maryland, on a small river of the same name, which runs into the Potomac a little below the town; forty-five miles S.S.W. of Annapolis, west, thirty-four. It contains an episcopal church, a warehouse for the inspection of tobacco, &c. In the vicinity are the celebrated cold waters of Mount Misery.

PORTA (John Baptist), a learned Italian, born at Naples, in 1445. He held a kind of literary assembly at his house; but the court of Rome, suspecting their motives, prohibited the meetings. He wrote many learned works, particularly one on Physiognomy, and some tracts on Optics; and he discovered the Camera Obscura. See Optics, Index. He died in 1519.

Porta (Joseph), an eminent painter, born at Castel Nuova, in 1535. He studied under Salviati, and his works were much esteemed. He died in 1585.

Porta, or Vena Porta, in anatomy, a large vein distributed through the liver, in the manner of an artery. See Anatomy.

PORTABLE, *adj.* Lat. *portabilis.* Manageable by the hand; such as may be borne along with one.

How light and *portable* my pains seem now,
When that which makes me bend, makes the king bow. *Shakspeare.*

All these are *portable*
With other graces weighed. *Id. Macbeth.*

He had reason to do, gaining thereby the charge of *portage.* *Fell.*

The pleasure of the religious man is an easy and *portable* pleasure, such an one as he carries about in his bosom, without alarming the eye or envy of the world. *South.*

PORTAGE, a term used in North America to signify a carrying place over-land between navigable rivers or navigable parts of the same river. The name is also given to towns in the vicinity of the carrying places.

PORTÆ Romanæ, in ancient geography, gates of Rome; according to Pliny, Romulus left but three, or at most four, gates of Rome; afterwards, on enlarging the pomœria, or compass of the city, they amounted to thirty-seven.

Portal, in architecture, a little gate where there are two gates of a different size; also a little square corner of a room cut off from the rest by the wainscot, and forming a short pas-

sage into the room. The same name is also sometimes given to a kind of arch of joiners' work before a door.

PORT'ASS, *n. s.* Sometimes portuis; and by Chaucer, porthose. A breviary; a prayer-book.

In his hand his *portesse* still he bare,
That much was worn, but therein little red;
For of devotion he had little care. *Spenser.*

An old priest always read in his *portass* mumpsimus domine for sumpsimus; whereof when he was admonished, he said that he now had used mumpsimus thirty years, and would not leave his old mumpsimus for their new sumpsimus. *Camden.*

PORTATE, or a CROSS PORTATE, in heraldry, a cross which does not stand upright, as crosses generally do, but lies across the escutcheon in bend, as if it were carried on a man's shoulder.

PORT-CRAYON, a pencil-case, which is usually four or five inches long, and contrived so as that the pencil may slide up and down. Its inside is round, and its outside is sometimes filed into eight sides or faces, on which are drawn the sector lines; sometimes it is made round both without side and within, and has its length divided into inches and parts of inches.

PORTCULLIS, or PORTCULLICE, in fortifications, is an assemblage of several large pieces of wood, joined across one another like a harrow, and each pointed with iron at the bottom. They are sometimes hung over the gateway of old fortified towns, ready to let down in case of surprise, when the gates could not be shut.

PORTE, a title given, or rather taken by the grand signior. The origin of this title is said to be derived from the principal port or gate of Constantinople, which is so magnificent that the Turks suppose it to have no equal in the world.

PORTEND', *v. a.*, PORTEN'TION, *n. s.*, PORTENT', PORTEN'TOUS, *adj.* } Latin, *portendo.* To foretoken; foreshow as omens: a portent is an ill omen; prodigy: portentous, foretokening ill.

As many as remained, he earnestly exhorted to prevent *portended* calamities. *Hooker.*

Doth this churlish superscription
Portend some alteration in good-will? *Shakspeare.*

O, what *portents* are these?
Some heavy business hath my lord in hand,
And I must know it. *Id. Henry IV.*

They are *portentous* things
Unto the climate that they point at. *Shakspeare.*

A moist and a cool summer *portendeth* a hard winter. *Bacon.*

True opener of mine eyes,
Much better seems this vision, and more hope
Of peaceful days *portends*, than those two past. *Milton.*

Overlay
With this *portentous* bridge the dark abyss. *Id.*

Far be it from you to be dismal and direful comets, that *portend* nothing but horror and death to the earth. *Bp. Hall.*

Every unwonted meteor is *portentous*, and some divine prognostic. *Glanville.*

Although the red comets do carry the *portensions* of Mars, the brightly white should be of the influence of Venus. *Browne.*

My loss by dire *portents* the god foretold;
Yon riven oak, the fairest of the green. *Dryden.*

The ruin of the state in the destruction of the church is not only *portended* as its sign; but also inferred from it as its cause. *South.*

Let us look upon them as so many prodigious exceptions from our common nature, as so many *portentous* animals, like the strange unnatural productions of Africa. *South.*

The petticoat will shrink at your first coming to town; a touch of your pen will make it contract itself, and by that means oblige several who are terrified or astonished at this *portentous* novelty. *Addison.*

POR'TER, *n. s.*, POR'TERAGE, POR'TRESS. } Fr. *portier;* Lat *porta*, a gate. One that has the charge of a gate; one who waits to receive, or who carries messages: porterage is money paid for carriage: portress, the feminine of porter.

PORTER, Anna Maria, a popular novelist, born in England, but descended from an Irish family that acted a conspicuous part in the contest between James II. and the Prince of Orange. The subject of this brief memoir evinced an unusual precocity of genius. At the age of thirteen years she commenced her subsequently brilliant career of authorship by the publication of her Artless Tales. These stories betrayed many marks of a juvenile and unpractised pen, but accompanied by as many indications of the fertility of invention and fluency of style, which imparted so great a charm to her more matured productions. Her next work, *Walsh Colville*, is founded on facts, and is interwoven with circumstances in which the fair Narrator felt a personal interest. Amongst her after works are, Octavia; The Hungarian Brothers; Don Sebastian, or the House of Braganza, an Historical Romance. The last work alone is sufficient to place its author amongst the first class of British novelists. To these are to be added, The Recluse of Norway, The Village of Mariadorpt, The Fast of St. Magdalen, ballads, romances, &c. Her style in general is graceful, fluent, admirably adapted to the immediate purpose; her narrative smooth, inartificial, spirited; her didactic lessons abounding with an impressive and irresistible effect. In private life she was affable, unaffected, and possessed of extraordinary conversational powers. She died in 1832.

PORTER, a kind of malt liquor much drunk in London, which principally differs from ale and pale beer in its being made with high dried malt. See ALE and BREWING.

PORTEUS (Dr. Beilby), bishop of London, was a native of Yorkshire, where he was born about the year 1731; but he himself was accustomed to trace his descent from a Scottish family. His father, a tradesman of but little eminence, resided for many years in the north of England; and it was at the grammar-school at Ripon, under the care of the Rev. John Hyde, that young Porteus commenced his classical career. By that gentleman he was qualified for the university, having determined on the church as a profession; and accordingly, with a zeal worthy of his future fortune, but an ambition that did not extend beyond a rural cure, he was entered at Christ's College, Cambridge. Mr. Porteus obtained his first degree of B. A. in

1752, when he was only seventeen or eighteen years of age. The same year he gained one of the two gold medals, held out as a remuneration to those who should produce the best classical essays. In 1755 the degree of M. A. was conferred upon this respectable student, who now began to behold the dawn of his good fortune; for he was elected a fellow by his college, and nearly at the same time appointed one of the preachers at Whitehall chapel. It was not, however, until 1759 that Mr. Porteus was known beyond the limits of his university, for it was then that he obtained the Seatonian prize, for the best composition on Death, which he published soon after, in conformity with the will of the founder. In this poem is the excellent passage on war which has been so frequently quoted.

> One murder makes a villain,
> Millions a hero; princes are privileged
> To kill, and numbers sanctify the crime.
> Ah! why will kings forget that they are men?
> And men that they are brethren? Why delight
> In human sacrifice? Why burst the ties
> Of nature, that should knit their souls together
> In one soft bond of amity and love?
> They yet still breathe destruction, still go on,
> Inhumanly ingenious to find out
> New pains for life—new terrors for the grave!
> Artificers of death! Still monarchs dream
> Of universal empire growing up
> From universal ruin. Blast the design,
> Great God of hosts! nor let thy creatures fall
> Unpitied victims at ambition's shrine!

In 1761 his pen was occupied in controversial divinity. A little before this period appeared a work, entitled The History of the Man after God's own Heart; in which the many glaring defects in the character of David were artfully exposed and heightened. Mr. Porteus undertook to vindicate the Scripture account of the royal psalmist; he accordingly preached a sermon, November 29th, before the university of Cambridge, which he published under the title of The Character of David, King of Israel, impartially stated. It is perhaps to this little work that his future fortunes are to be attributed; for Dr. Secker, who, in 1758, had been translated from the see of Oxford to the archiepiscopal throne of Canterbury, having read this discourse, was induced to take Mr. P. under his immediate patronage. He accordingly was pleased immediately to appoint him one of his domestic chaplains, and presented him with a living in Kent, and another in Middlesex. A prebendal stall in Peterboro' soon followed: in return our divine on the death of the archbishop in 1768 edited and published his sermons and life. Previously to this event Mr. P., in 1765, married Miss Hodgson, a lady of some fortune, whose father had resided at Matlock in Derbyshire. The ceremony was performed there by his friend the primate. Two years after this, the degree of D. D. was conferred on him by his own university, and still greater honors now awaited him. The queen, hearing of Dr. Porteus's reputation, and being apprised of the excellence of his private character, appointed him her private chaplain; and such a high opinion did her majesty entertain of his piety and endowments, that she was determined to complete what Secker had begun. Accordingly, in January 1777, on the translation of Dr. Markham to the archbishopric of York, the royal interposition was employed in favor of our divine, who was immediately raised to the see of Chester. In 1783 he produced a volume of his own sermons on several subjects; it was followed by two more, and these have since been considered as models. In 1787 a considerable change took place in his life, and the scene of his labors was not a little extended; for, on the death of the amiable and learned bishop Lowth, Dr. Porteus was translated to the see of London. This event gave entire satisfaction to every description of Christians in the metropolis. In the year 1792 he commenced a series of very popular lectures, at St. James's church, Westminster. They were delivered every Friday, to crowded and genteel audiences, and had for their object to demonstrate the truth of the gospel history, and the divinity of Christ's mission. It was on this occasion that, towards the latter end of his life, he acquired the character of an accomplished orator; and seems fully persuaded himself of the truth of those doctrines so earnestly recommended by him. This good prelate died early in 1809.

PORT-FIRE, a composition for setting fire to powder, &c. Port-fires are frequently used by artillery people in preference to matches; and they are distinguished into wet and dry port-fires. The composition of the former is saltpetre four parts, sulphur one, and mealed powder four. When these materials are thoroughly mixed and sifted, the whole is to be moistened with a little linseed oil, and rubbed between the hands till all the oil is imbibed by the composition. The preparation for dry port-fires is saltpetre four parts, sulphur one, mealed powder two, and antimony one. These compositions are driven into small paper cases, to be used when necessary.

PORTGREVE, or PORTGRAVE, was anciently the principal magistrate in ports and other maritime towns. The word is formed from the Saxon port, a port or town; and geref, a governor. It is sometimes also written port-reve. Camden observes that the chief magistrate of London was anciently called port-greve; instead of whom, Richard I. ordained two bailiffs; and soon afterwards king John granted them a mayor for their yearly magistrates.

PORTICI, a town and palace of Naples, in Lavora; four miles from the capital, charmingly situated on the sea-side, near mount Vesuvius. It is enriched with a vast number of fine statues, and other remains of antiquity, taken out of the ruins of Herculaneum, over which it stands. The museum consists of sixteen rooms, in which the different articles are arranged with great taste. See POMPEII and NAPLES.

PORTICO, *n. s.* Fr. *portique;* Ital. *portico;* Lat. *porticus.* A covered walk; a piazza.

> The rich their wealth bestow
> On some expensive airy *portico;*
> Where safe from showers they may be born in state
> And free from tempests for fair weather wait.
> *Dryden.*

A PORTICO, in architecture, is a kind of gallery on the ground; or a piazza encompassed with arches supported by columns, where people walk under covert. The roof is usually vaulted, sometimes flat. The ancients called it lacunar. Though the word portico be derived from porta, a gate or door, yet it is applied to any disposition of columns which form a gallery, without any immediate relation to doors or gates. The most celebrated porticoes of antiquity were those of Solomon's temple, which formed the atrium or court, and encompassed the sanctuary; that of Athens, built for the people to divert themselves in, and wherein the philosophers held their disputes and conversations (see PORCH); and that of Pompey at Rome, raised merely for magnificence, consisting of several rows of columns supporting a platform of vast extent; a draught whereof Serlio gives us in his antique buildings. Among the modern porticoes, the most celebrated is the piazza of St. Peter of the Vatican. That of Covent Garden, London, the work of Inigo Jones, is also much admired.

PORTION, *n. s.* & *v. a.* Fr. *portion;* Lat. *portio.* A part; assigned part; child's part or inheritance.

These are parts of his ways, but how little a *portion* is heard of him! *Job* xxvi. 14.

Here's their prison ordained and *portion* set. *Milton.*

Should you no honey vow to taste,
But what the master-bees have placed
In compass of their cells, how small
A *portion* to your share would fall! *Waller.*

Of words they seldom know more than the grammatical construction, unless they are born with a poetical genius, which is a rare *portion* among them. *Dryden.*

As soon as any good appears to make a part of their *portion* of happiness, they begin to desire it. *Locke.*

Those great *portions* or fragments fell into the abyss; some in one posture and some in another. *Burnet.*

The gods who *portion* out
The lots of princes as of private men,
Have put a bar between his hopes and empire. *Rowe.*

Leave to thy children tumult, strife, and war,
Portions of toil, and legacies of care. *Prior.*

When he considers the temptations of poverty and riches, and how fatally it will affect his happiness to be overcome by them, he will join with Agur in petitioning God for the safer *portion* of a moderate convenience. *Rogers.*

Argos the seat of sovereign rule I chose,
Where my Ulysses and his race might reign,
And *portion* to his tribes the wide domain. *Pope.*

Him *portioned* maids, apprenticed orphans blest,
The young who labour and the old who rest. *Id.*

One or two faults are easily to be remedied with a very small *portion* of abilities. *Swift.*

Take, Madam, the reward of all your prayers,
Where hermits and where bramins meet with theirs;
Your *portion* is with them. Nay, never frown,
But, if you please, some fathoms lower down. *Cowper.*

PORTLAND, a post-town and port of entry, Cumberland county, Maine, United States; fifty-four miles N.N.E. of Portsmouth, and 115 N.N.E. of Boston. It is a very pleasant town, finely situated on a peninsula in Casco Bay. It is the shire town of the county; and, in point of population, wealth, and commerce, the most considerable in Maine. It contains a very elegant court-house, an alms-house, a market-house, a bank, an insurance-office, an academy, a young ladies' boarding-school, a library of 1300 volumes, and eight houses of public worship, three for Congregationalists, two for Baptists, one for Episcopalians, one for Methodists, and one for Friends. The town is generally very well built, a large proportion of the public and private buildings are of brick, and many of them are elegant.

The harbour of Portland is one of the best on the continent. It is safe and capacious, easy of access, and is never frozen over, except for a few days during the severity of winter. On a head-land, in Cape Elizabeth, near the entrance of the harbour, there is a stone light-house seventy feet high, erected in 1790. The town is defended by Fort Preble and Fort Scammel, two fine forts on opposite sides of the ship channel, one mile and a half from the light-house, both mounting thirty-five pieces of cannon. At the east end of the town is Fort Burrows, in the rear of which are some other military works. On the highest eminence of Mount Joy's neck, on the north-east side of the town, stands an observatory, about seventy feet high, which affords an extensive, variegated, and beautiful view of the town, the harbour, the islands, and the interior country.

The situation of Portland, with regard to an extensive and growing back country, is such as to insure to it extensive business and high commercial importance. The exports consist chiefly of lumber, beef, fish, butter, &c. The shipping is principally employed in the fisheries, coasting business, and the trade to the West Indies, Russia, and, of late, to the East Indies. The total amount of shipping belonging to this port, on the 1st of June 1818, was 27,770 tons.—Portland was formerly included in Falmouth; and, in 1775, the principal part of the town was burnt by the British. It was incorporated by its present name in 1786.

PORTLAND ISLE, an island, or rather peninsula, of England, in the county of Dorset, opposite Weymouth. Connected with the main-land by a singular ridge of pebbles, called the Chesil Bank, which extends seventeen miles west-ward from the island, along the coast; the island itself does not extend more than four miles and a half in length, and two in breadth. It consists of one continued mass of freestone, forming the famous Portland stone, of which such quantities have been exported to the metropolis and other parts of England. The rocks form a barrier round the island, except at the landing place on the north, where Portland castle is situated. It was built by Henry VIII., is of great strength, and completely commands Weymouth road. During the great rebellion it was garrisoned for the parliament, but taken, through a stratagem, by the king's troops. The island constitutes only one parish, and has but one church, standing near the sea; it contains, however, several considerable hamlets. The inhabitants are chiefly employed in agriculture, and in the quarries. The arable lands produce all sorts of grain, and

about 3000 sheep are kept. The corn is of excellent quality; and the sheep have been long noted for their delicate flavor, and elegant though small appearance. The principal freestone quarries are at Kingston. There is a pier, where upwards of 6000 tons of stone are annually shipped. The freestone rocks are intersected by strata of black and red schistus, and of a species called sugar-candy stone; they are also interspersed with petrified shells. Two light-houses have been erected on the island, one in 1716, and the other in 1789: the latter is a circular conical structure, sixty feet high. The isle of Portland has been the scene of many important transactions in the annals of England: it was fortified before the year 1142, with a castle, now a ruin, but was formerly of great extent.

PORTLAND ISLAND, an island in the South Pacific Ocean, near the east coast of New Zealand. Captain Cook in 1773 left on this island some pigs, fowls, seeds, and roots, for cultivation. Long. 178° 12′ E., lat. 39° 25′ S. This is also the name of a cluster of islands in the Indian Ocean, west of New Hanover, so named by Carteret in 1767. They are about six or seven in number; very low, and extend seven miles, in a chain east and west. They are of dangerous access, being environed with reefs and sand-banks, and covered with trees. The north-east point of the most eastern isle is in long. 147° 18′ 45″ E., lat. 2° 36′ S.

PORTLAND VASE, a celebrated vase, long in possession of the Berberini family; but which was purchased for 1000 guineas by the duke of Portland, from whom it has derived its present name. Its height is about ten inches, and its diameter, where broadest, six. There are a variety of figures upon it of most exquisite workmanship, in bass relief of white opaque glass, raised on a ground of deep blue, which appears black except when held against the light. It appears to have been the work of many years, and there are antiquarians who date its production several centuries before the Christian era; since, as has been said, sculpture was declining in excellence in the time of Alexander the Great. Dr. Darwin supposes it to represent a part of the Eleusinian mysteries. In one compartment, three exquisite figures are placed on a ruined column, the capital of which is fallen, and lies at their feet among other disjointed stones: they sit under a tree on loose piles of stone. The middle figure is that of a female in a reclining and dying attitude, with an inverted torch in her left hand, the elbow of which supports her as she sinks, while the right hand is raised and thrown over her drooping head. The figure on her right hand is a man, and that on her left a woman, both supporting themselves on their urns, and apparently thinking intensely. Their backs are to the dying figure, towards whom, however, their faces are turned, although without their making one effort to assist her. On another compartment of the vase is a figure coming through a portal, and going down with extreme timidity into a darker region, where he is received by a beautiful female, who stretches forth her hand to help him: between her knees is a large and playful serpent. She sits with her feet towards an aged figure, who has one foot sunk into the earth, and the other raised on a column, with his chin resting on his hand. Above the female figure is a cupid preceding the first figure, and beckoning him to advance. This first figure holds a cloak or garment, which he seems anxious to bring with him, but which adheres to the side of the portal through which he has passed. In this compartment there are two trees, one of which bends over the female figure, and the other over the aged one. On the bottom of the vase there is another figure on a larger scale than that we have already mentioned, but not so well finished nor so elevated. This figure points with its finger to its mouth. The dress appears to be cumbersome and curious, and above is the foliage of a tree. On the head of the figure there is a Phrygian cap: it is not easy to say whether this figure be male or female. On the handles of the vase are represented two aged heads with the ears of a quadruped, and from the middle of the forehead rises a kind of tree without leaves. These latter are in all probability mere ornaments, and have no connexion with the rest of the figures, or with the story represented on the vase.

PORTLANDIA, in botany, a genus of the monogynia order, pentandria class of plants; natural order, doubtful: COR. elevated and funnel-shaped; the antheræ are longitudinal: CAPS. pentagonal, and retuse at top; bilocular, and crowned with a pentaphyllous CAL. There are two species, viz. 1. P. grandiflora; and 2. P. hexandra. The former has been particularly described by Dr. Browne, who has also given a good figure of it. It has frequently flowered in the royal garden at Kew, and in Dr. Pitcairn's at Islington. The external bark is remarkably rough, furrowed, and thick; it has no taste. The inner bark is very thin, and of a dark brown color. Its taste is bitter and astringent, and its virtues are the same as those of the Jesuit's bark. Infused in spirits of wine with a little orange peel, it makes an excellent stomachic tincture.

PORTMANTEAU, *n. s.* Fr. *portmanteau.* A chest or bag in which clothes are carried.

I desired him to carry one of my *portmanteaus*; but he laughed, and bid another do it. *Spectator.*

Your cunningest thieves (and what else are readers who only read to borrow, i. e. to steal), use to cut off the *portmanteau* from behind, without staying to dive into the pockets of the owner. *Swift.*

PORTO BELLO, in the province of Panama, on the north coast of the isthmus of Darien, from being one of the most celebrated cities of Spanish America, has, since the discontinuance of the galleons, dwindled to total insignificance. It is placed on the declivity of a mountain surrounding the port, and consists of about 130 houses, chiefly of wood, or the basement of stone, forming one long street. The port, discovered by Columbus in 1502, is entered by a channel with only fifteen feet water, which was formerly defended by three castles, destroyed by the English under Vernon in 1742. North-west of the city is the cove of La Caldera, sheltered from all winds. The climate of Porto Bello is eminently unhealthy, being surrounded by lofty

hills, that cause a total stagnation of air, and at the same time produce deluges of rain, and tremendous thunder and lightning. One of the mountains rising from the port presents a similar phenomenon to that of the Table at the Cape of Good Hope, its top being covered with a white cloud, which, when it descends lower than common, indicates a storm.

The woods which surround the town, and greatly add to its unhealthiness, abound in tigers, which often descend into the streets, and carry off the animals they meet, and even at times human beings. Snakes are also very numerous, and the toads are a perfect plague, the streets after rain being covered with them so thick that it is almost impossible to walk without treading on and being bitten by them.

Porto de Naos, a harbour on the south coast of Lancerota, one of the Canaries, is formed by a ridge of rocks, scarcely rising above the water. These rocks break the force of the waves, so that within the sea is perfectly calm, and vessels not drawing more than eighteen feet of water may enter at high tides. It is the only port in the Canaries fitted for cleaning and repairing large vessels. Westward is a square castle of stone, mounted with cannon, but of no strength. There is no town or village near, but only some magazines where corn is deposited.

Porto Farina, called also Garel Mailah, or the Cave of Salt, a sea-port of Tunis, at the mouth of the River Megerdah, which spreads here into a lake, and forms an excellent harbour. It is supposed to be the ancient Ruscicona.

Porto Ferrajo, a sea-port, and the chief place of the island of Elba, is on the west coast of the island, on a lofty point of land projecting into a commodious bay. It was once called Cosmopoli, from its founder, Cosmo I. duke of Florence. Its present name it received from the quantity of iron found in the neighbourhood. Porto Ferrajo is considered a strong place, being surrounded by nine bastions, and other works, and defended by two small forts called the Sletta and the Falcone. Its trade is not inconsiderable. In June, 1796, it was taken by the British, and retained until the peace of 1802. The residence of Buonaparte from the 4th of May, 1814, to the 26th of February here has given it an interest which it will long retain. Inhabitants 3000. Long. 10° 19′ 35″ E., lat. 42° 49′ 6″ N.

Porto Longone, a strongly fortified town on the east coast of the island of Elba. It stands on a large bay, defended by a castle on an almost inaccessible rock. Its inhabitants, about 1500, are chiefly fishermen. Four miles south-east of Porto Ferrajo.

Porto Mauricia, a town of the Sardinian states, in the province of Genoa, with 3000 inhabitants. It has a harbour and some trade. Fifty-six miles south-west of Genoa.

Porto Rico, an island of the West Indies, sixty miles east of Hispaniola, is of an oblong form, its greatest length being forty-one leagues east and west, and breadth fifteen leagues north and south. A chain of mountains runs through its whole length, with some branches diverging to the north and south, and extending to the coasts. The whole of these mountains are covered with wood, and in their intervals are fertile valleys and plains, watered by more than fifty rivers and rivulets, in whose sands gold dust is found, and four of the former are navigable two leagues from their mouth. The highest summits of the mountains are called the Peaks of Layoonita, which are often covered with snow, and are seen far at sea. The north coast is generally lined by a coral reef under water, at a little distance from the shore. The east coast is indented with many bays, formed by the continual action of the waves. A chain of about fifty small islands, extending twelve leagues in length, lie off the north-east coast, and serve as rendezvous for smugglers, but cannot be approached by large vessels.

The wild animals here are hogs, dogs, rats, all of which were originally brought to the island by European vessels. The productions of the island are altogether very trifling in comparison with its extent and natural fertility, and may be estimated at 4500 quintals of sugar, 2000 quintals of cotton, and 20,000 quintals of coffee; the other vegetable productions are rice, Indian corn, and tobacco. A great part is under pasture, and a vast number of cattle are reared.

The revenue raised in the island a few years since was £20,000 sterling, while the expenses were £65,000, of which £58,000 for the military establishment consisted of a regiment of regular infantry from Europe, and 2000 island militia. £100,000 was received in dollars annually from Mexico, and the surplus, after paying the deficit of the revenue, was applied to public purposes. The population of the island is estimated at about 136,000 individuals.

This island, discovered by Christopher Columbus in 1493, was at the time supposed to contain 600,000 inhabitants, who, understanding that the Spaniards had made themselves masters of Hispaniola, concluded that they were invincible. But some of their princes having doubts on this point the experiment was tried on one of the domestics of Columbus, who was murdered; after which they rose on the invaders, and put to death 150. The Spaniards are said to have retaliated by extirpating the whole of the native race. At the end of the seventeenth century, Porto Rico was taken by the English under the earl of Cumberland; but suffering much from dysentery they soon abandoned it.

St. Juan de Porto Rico, the capital, is situated on the north coast on the west point of an islet, joined to the main by a bridge. It contains six straight streets from north to south, intersected by six others at right angles. The houses of the first class are of stone, large and open, but wretchedly furnished. The buildings are, a cathedral and other churches, two convents of monks, one of nuns, and a general hospital. The fortifications are numerous and strong.

The harbour or road is three miles long and one and a quarter broad, and capable of containing 300 to 400 vessels; its depth is from two to seven fathoms. The channel is winding and intricate, and is buoyed off; two islets, Cabarita and Cabras, and many rocks level with the water, render it still more dangerous, and make a pilot

necessary. All vessels entering are obliged to pass within gun-shot of the Morro, whence they are hailed.

Other points of the island worth notice are the river Gurabo at the west end, in which the Spaniard Salcedo was drowned by the Indians in 1511, in order to discover whether or not the Spaniards were immortal. The Bay of Guanica, on the south coast, is an excellent port with a narrow entrance

Near the village of Caomo, on the considerable river of the same name, and on the south coast, is a warm sulphureous spring whose temperature is 95°. The Rio Lovisa is another large river of the island, having fourteen leagues course, and is navigable for large boats.

The principal capes of the island are, Punta Borriquen, the north-west point, surrounded by reefs; Cape Roxo, the south-west point: Cape St. John, the north-east point; Cape de Malapasqua, or St. Francis, the south-east point. The small islands dependent on Porto Rico are Bieque or Crab Island, five leagues from Cape Pinera, the east point of the island; it is seven leagues long and two leagues wide, and covered with wood. The English attempted to settle here towards the close of the seventeenth century, but were attacked by the Spaniards, who murdered all the men and carried the women and children to Porto Rico. The Danes, also, attempted an establishment in 1717, and the English a second time in the same year, but they were both driven off by the Spaniards. The island has since remained uninhabited, but is frequented both by the English and Danes to cut wood. The Tropic Keys are a cluster of small islands north of Bieque, named from the number of tropic birds that frequent them.

Porto Santo, a small island of the Atlantic, in the vicinity of Madeira, to which it forms a species of appendage. It was discovered by the Portuguese nearly about the same time as Madeira, some ships of that nation being driven hither by stress of weather. They have ever since occupied it, being attracted chiefly by an excellent harbour, where ships may lie in perfect security against all except south-west winds. The island does not much exceed fifteen miles in circumference, yet produces grain and provisions, and yields for export honey, wax, and dragon's blood. It is overrun with rabbits. Long. 16° 50′ W., lat. 33° 0′ N.

Porto Seguro, a province and town of Brasil, bounded north by Los Ibhios, east by the Atlantic, south by Espiritu Santo, and west by the new Francesco. It was first discovered by the Portuguese in 1500. Porto Seguro, the capital, is situated on the sea coast in the port of this name, formed by a reef or rather ledge of rocks, that run from an extended point of the main, about a mile out, forming a natural mole. These rocks are dry at low water, and terminate abruptly; appearing again at half a mile distance. To the northward the land rises to a steep hill, ascended by a winding path; and on its summit stands the town. The streets are broad and straight, but irregularly disposed; the houses generally of one story, low and ill built, of soft clay plastered over About half a dozen are of two stories, the largest of which is a quadrangular town-house, and prison, another the house of the governor (formerly a college of jesuits). The church is plain, has glass windows, and is by far the best building in the place. A new one has lately been erected. On the banks of the river below the town, stands a village full as large, the whole containing about 400 houses (or rather cabins), and 3000 inhabitants, slaves and Indians. Their employment is solely in a fishery off the islands and rocks of Abrolhos, where they catch large salmon, which they salt for the Bahia market. About fifty decked launches are employed in this fishery; they keep the sea a month or six weeks. The business of careening these launches, and making the necessary nets and lines, forms the work of those who remain in the town. Their lines are some of the best in the world, composed of cotton well twisted, and rubbed several times with a glutinous resin that hardens in the sun, and is proof against salt water. The property of the launches and their cargoes is confined to a few individuals, who are comparatively rich. Among the inhabitants are some noble Portuguese Families. Ninety-two miles south of Jorge, and 286 N. N. E. of Espiritu Santo.

Porto Seguro, a river of the above province, rising in the mountain of Frio.

Porto Vecchio, a winding gulf on the south-east of Corsica, is one of the best harbours of the Mediterranean. The town and fortress at its head are on a high rock, of difficult access. The works are four batteries, commanded by some hills: large vessels can but barely approach within gun-shot. Being very unhealthy in summer, it is in that season abandoned by the greater part of the inhabitants, who only amount to about 1500. The south point of the gulf is Cape Sigli, or Chiappa; south of which are several islands, usually called the Cape Islands, which are foul all round. Between Porto Vecchio and Cape Bianca, the south point of the island, the coast has many little coves, and some islands, the most conspicuous of which is Toro (the Bull). The town is considered unhealthy.

PORTOGRUARO, a trading town of Austrian Italy, at the confluence of the rivers Lemene and Reghena. The air is extremely unhealthy on account of the neighbouring marshes. It is the see of a bishop. Inhabitants 4000. Twenty miles west by south of Palma Nova.

PORTONOVO, a town on the sea coast of the Carnatic, 117 miles S.S.W. from Madras, and thirty-two miles south by west from Pondicherry.

PORTPATRICK, a town of Wigtonshire, so named from St. Patrick, pleasantly seated on the nearest point of Great Britain to Ireland, opposite Donaghadee; the passage being only twenty miles over. It has a fine exposure to the south, and is surrounded on the other sides by a ridge of small hills in the form of an amphitheatre. It is much frequented during the summer months for bathing. Its harbour was formerly small and incommodious, but is now one of the finest in Britain, and has a reflecting light-house. Packet boats sail regularly between this port and Donaghadee, with the mail and passengers; and mail coaches are now established from London and Edinburgh to Portpatrick

and from Dublin to Donaghadee. Since these improvements, the population, buildings, and commerce of the town have greatly increased. The chief trade is the importation of black cattle and horses from Ireland. It stands seventy-five miles west of Dumfries, and 133 south-west of Edinburgh.

PORTRAIT, *n. s.* & *v. a.* } Fr. *portrait.*
PORTRAITURE, } A picture drawn
PORTRAY, *v. a.* } after the life: to paint after life.

Take a tile, and so *portray* upon it the city of Jerusalem. *Ezekiel.*

In most exquitite pictures, they blaze and *portrait* not only the dainty lineaments or beauty, but also round about shadow the rude thickets and craggy cliffs. *Spenser.*

I *portrait* in Arthur the image of a brave knight, perfected in the twelve private moral virtues. *Id.*

By the image of my cause I see
The *portraiture* of his. *Shakspeare. Hamlet.*

The earl of Warwick's ragged staff is yet to be seen *portrayed* in many places of their church steeple. *Carew.*

Let some strange mysterious dream
Wave at his wings in airy stream
Of lively *portraiture* displayed,
Softly on my eye-lids laid. *Milton.*

Shields
Various, with boastful argument *portrayed.* *Id.*

As this idea of perfection is of little use in *portraits*, or the resemblances of particular persons, so neither is it in the characters of comedy and tragedy, which are always to be drawn with some speck of frailty, such as they have been described in history. *Dryden.*

Our phenix queen was there *portrayed* too bright,
Beauty alone could beauty take so right. *Id.*

This is the *portraiture* of our earth, drawn without flattery. *Burnet's Theory of the Earth.*

The figure of his body was strong, proportionable, beautiful; and, were his picture well drawn, it must deserve the praise given to the *portraits* of Raphael. *Prior.*

Her wry-mouthed *portraiture*
Displayed the fates her confessors endure. *Pope.*

He delineates and gives us the *portraiture* of a perfect orator. *Baker.*

In *portraits*, the grace, and, we may add, the likeness, consists more in taking the general air, than in observing the exact similitude of every feature. *Reynolds.*

PORTRAIT PAINTING. See PAINTING.

PORTSMOUTH, a borough and sea-port in Hampshire, with markets on Tuesday, Thursday, and Saturday. It is the most considerable haven for men of war, and the strongest fortified place in England; situated seventy-two miles from London, twenty miles south-east of Winchester, and on the south-west point of the island of Portsea. The origin of the town is asserted to have been the retiring of the sea from the upper parts of the harbour, which rendering Portchester very inconvenient, the inhabitants removed to Portsea Island, and built Portsmouth. The earliest account handed down to us appears in the Saxon Chronicle of 501, when it was called Portesmuthe. Probably it derives its name from its situation.

It is a handsome, well built, and neatly paved town, of a quadrangular form, about a mile and a quarter in circumference. The principal streets run parallel with each other, and are intersected by others of less note. The point is separated from the town by a gateway and drawbridge. It is governed by a mayor, twelve aldermen, and burgesses, and sends two members to parliament. In the centre of the town stands the parish church, erected between 1210 and 1220. It is in the form of a Latin cross, and by frequent repairs it now presents an incongruous appearance of Saxon and Doric architecture. The fortifications of Portsmouth anciently consisted of a wall of timber, covered with earth; a bastion to the north-east, and two forts of hewn stone at the mouth of the harbour, begun by Edward IV. and augmented by Henry VII. In the reign of Elizabeth it was fortified with new works, and in succeeding reigns it received great additions to its strength and magnificence. It now presents nearly an equal quadrangle; on the land side is an inner wall, of immense substance, rising to a considerable height, fronted with Portland stone, and a parapet wall of brick, with numerous batteries, redoubts, &c.

The moats are of great depth and width, and can be filled with water from the sea; the whole is bounded by an extensive glacis. Fronting the sea is the queen's bastion, mounted with ten thirty-six pounders, and bombs of an immense size. To the right is a very strong redoubt, and near the entrance to the harbour is the platform, or saluting battery, mounted with four thirty-six, and twenty-one twelve-pounders. At the end of the platform is erected a semaphore, for transmission of signals, which is effected between this and London in three minutes. It is of wood framed and bolted, and contains several apartments, and a variety of beautiful mechanism.

The garrison of Portsmouth, during peace, generally consists of two regiments of infantry, royal marines, royal artillery, and royal marine artillery, who are employed to protect the fortifications, the dock-yard, and other public property in the towns and outworks, and the royal engineers for keeping the fortifications in order. It would require about 13,500 troops to man the towers and forts in case of a siege. In various parts of the town suitable residences are set apart for the officers of the garrison: and attached to the garrison is a chapel, anciently belonging to an hospital.

The principal point of attraction in this celebrated port is the dock-yard, which was established in the reign of Henry VIII., and has received such additions and improvements that it is now the first in the world. It is situated in Portsea, adjoining the harbour, and covers an extent of from 115 to 120 acres of ground. The docks, arsenals, storehouses, barracks, &c., are very extensive, and kept in the finest order. The machinery worked by steam, for the making of blocks and other articles, is perhaps the most perfect of the kind in existence. See BLOCKS and DOCK YARDS. During the war, the number of men employed in the yard was about 4200; but since the peace the establishment has been reduced, and at present they amount to about 2500.

In 1377 the French landed, and burnt and plundered Portsmouth, but were driven back to

their ships with great slaughter by the inhabitants. In 1544 the French fleet, under d'Annebaut, came with intent to destroy Portsmouth; but were ultimately repulsed by viscount Lisle, in the Great Harry. In 1662 Charles II. was united to the infanta of Portugal in the garrison chapel, with great ceremony; the register is still preserved in this church. In 1628 Felton assassinated the duke of Buckingham, whose monument forms the altar piece to the parish church. In 1712 this place gave birth to the philanthropic Jonas Hanway.

Here are meeting-houses for the Unitarians, Methodists, and Baptists. A fair takes place annually, in the High Street, commencing on the 10th of July, and continuing its noisy and unacceptable carnival for fifteen days.

Portsmouth, a post town and port of entry, Rockingham county, New Hampshire, on the south side of the Piscataqua, three miles from the sea; fourteen E. N. E. of Exeter, twenty-four north of Newburyport, forty-five E. S. E. of Concord, fifty-four S. S. W. of Portland, and fifty-six north by east of Boston. It is the most considerable town, and the only sea-port in New Hampshire, and is handsomely built. Many of the houses are elegant. It has thirty-two good streets, a court-house, jail, almshouse, academy, athenæum, two market-houses, a town-hall, a custom-house, an insurance-office, five banks, including a branch of the United States bank, and seven houses of public worship: three for Congregationalists, one for Episcopalians, one for Baptists, one for Methodists, and one for Universalists. The Episcopal church is a spacious and elegant brick edifice, from the cupola of which there is a handsome view of the town and surrounding country.

Portsmouth is well situated for trade, and has considerable commerce. The shipping owned here in 1818 amounted to 28,351 tons. The harbour is one of the best in the United States, having through its whole passage up to the town forty-two feet water at low tide, and owing to the rapidity of the current, which is equal to five miles an hour, it is never frozen. It is so defended against storms by the adjacent land, that ships may securely ride here in any season of the year; and it is almost impregnable by its natural situation. The entrance is defended by two forts—Fort Constitution on Great Island, and Fort M'Clary, opposite to it, in Kittery. There are three other forts built for the defence of the harbour, but not garrisoned at present. There is also a light-house on Great Island. On the 26th of December, 1802, 120 buildings, in 1806 twenty buildings, including the Episcopal church, and in 1813 173 buildings, were destroyed in this town by fire. The parts which were burnt by these fires have been handsomely rebuilt with brick.

In the Piscataqua, opposite to the town, is Navy Island, on which there is a United States navy yard. The island belongs to the general government, and is convenient for building ships of war. It contains a large ship-house, a hospital, barracks, store-houses, three wet-docks, &c. The Washington, a seventy-four gun ship, was launched here in 1814.

Portsmouth, a post town in Newport county, Rhode Island, on the north end of the island; seven miles north of Newport. It is connected with Tiverton by a bridge, and with Bristol by a ferry. In the north-west part of the town there is a coal mine.

Portsmouth, a post town of Norfolk county, Virginia, on the south-west side of Elizabeth river, opposite Norfolk, one mile distant from it; both of which constitute one port of entry; 110 miles east by south of Petersburgh. It is pleasantly situated, and regularly laid out, and contains a court-house, a jail, a sugar refinery, and four houses of public worship, one for Episcopalians, one for Baptists, one for Methodists, and one for Roman Catholics. The courts for the county of Norfolk are held here.

PORTUGAL.

PORTUGAL, a modern kingdom, the most western of Europe, is bounded by Spain and the Atlantic, and extends from 36° 56′ to 42° 7′ of N. lat., and from 7° 34′ to 9° 30′ of W. long. Its form is oblong; its length being from north to south 350 miles, and its average breadth about 120. The following estimate of its population was published in 1802:

Provinces.	Sq. miles.	Population.
Entre Douro e Minho, in the north-west	3,490	907,965
Tras os Montes in the north-east	5,450	318,665
Beira (central)	8,725	1,121,595
Estremadura (containing Lisbon)	9,855	826,680
Alentejo in the south-east	10,575	380,480
Algarva in the south	2,780	127,615
	40,875	3,683,000

The most striking circumstance here to be noticed is the great populousness of Entre Douro e Minho, and the extreme thinness of the inhabitants in Alentejo and Algarva.

The principal towns of Portugal with their population are:—

	Population.
Lisbon, the capital,	230,000
Oporto,	74,000
Elvas,	16,000
Coimbra,	15,000
Braga,	13,000
Setubal	12,000
Evora,	12,000
Beja,	9,000
Santarem,	8,000
Lamego,	6,600
Estremos,	6,500
Faro,	6,000
Tavira,	5,800
Portalegre,	5,600

	Population
Braganza, ...	5,000
Viseu, ...	5,000
Leyria, ...	4,500
Castel Branco, . . .	4,000
Lagos, ...	4,000

Of the late colonial possessions of Portugal the following is an estimate of the same date:—

	Sq. miles.	Population.
In America, Brasil, and part of Guiana, . .	2,100,000	2,400,000
In Africa, Madeira, the Azores, and Cape de Verd Islands, with the settlements in Guiana, Angola, and Mozambique, ...	50,000	460,000
In Asia, Goa, Timor, and Macao, ...	1,000	110,000
	2,151,000	2,970,000

Some of the most important of the mountain chains of Spain penetrate into this country, from east to west, and terminate in large promontories on the Atlantic shore. The most remarkable of these are the Serra de Estrella, nearly in the centre of Portugal, and the Serra de Monchique, the extremity of which, Cape St. Vincent, is the south-west point of Europe. Between the mountains are a number of picturesque valleys; but the only plains of great extent are one to the south of the Tagus, near Santarem, and another at the mouth of the Vouga, in the north. The chief rivers also from Spain are the Tagus, the Douro, the Minho, and the Guadiana: mineral and hot springs are also numerous; but water is so scarce for culinary purposes, and so bad in Alentejo, that many places are almost uninhabitable. The climate in Portugal is in general mild and pleasant, owing to the height of the mountains, and the great extent of c ast; but in the north-east (Tras os Montes) the air is sharp. Snow seldom lies here on the low ground; but the rains of winter are often heavy.

Wheat, barley, oats, flax, hemp, and other productions of a northern latitude, are raised in the high grounds; vines and maize in those of warmer temperatures; and rice in the low valleys. The fruits are olives, oranges, and lemons. Silk of good quality also abounds, but the indolence of the people but feebly avails itself of these advantages. Even in the case of wool, there prevails a general inattention to quality, though the flocks are in considerable numbers. Asses and mules are used both for travelling and agriculture. The Portuguese farmers are quite unacquainted with rotation in crops, and nothing can be more awkward than their implements. In one province, however, that of Entre Douro e Minho, the case is different. The people here are industrious, and the supply of water is good, partly from natural streams, and partly from wells dug in the sides of the mountains. Here, accordingly, the hills are covered with vineyards to their tops; olive, orange, apricot, and other fruit trees are abundant; while, in situations of less warmth, the wheat, barley, and oats of a northern latitude are grown.

Of the abundant mineral productions of this country none but iron has been wrought, in consequence partly of the scarcity of fuel, partly of the supply of minerals (chiefly copper and lead) from Brasil: but the mountains abound in fine marble, and contain traces of gold and silver. Large quantities of salt are formed by natural evaporation in bays along the coast.

The few manufactures of Portugal are in general carried on in separate cottages, like the coarse woollens of North Wales, or the linen of Normandy, and are founded on the primitive plan of every district manufacturing for its own consumption: they are principally of woollens, silk, and earthenware. Cotton has been attempted, and paper, glass, and gunpowder, are made in a few places.

The navigation and commerce of Portugal are, however, considerable, though for a long time past the import and export trade has been managed chiefly by foreign merchants, particularly British. The exports consist chiefly of raw produce, as wine, salt, and wool. Of wine the average value exported is nearly £2,000,000; of salt £300,000; of wool £100,000. The imports are various, viz. corn, flour, fish, woollens, linen, cotton, lace, hardware, hats, shoes, stockings; in short, manufactures of almost every kind that can be supplied by a more advanced country like England. The annual amount, however, is not great, the total imports of Portugal, including corn, being below £3,000,000. The intercourse with Brasil, restricted ostensibly to Portuguese merchants, has in fact long also been open to foreigners, trading under the name of some native merchant; government interfering only in regard to custom duties. The produce of the Brasilian mines, whether gold, silver, or precious stones, imported formerly to Lisbon, and thence throughout Europe, is now shipped directly from Brasil to European ports.

The religion of Portugal is the Roman Catholic, maintained in a state of as gross superstition as in Italy. The inquisition indeed has latterly acted only as an engine of civil police; but a vast number of monasteries are kept up, and a large portion of the best land of the kingdom is church property. The court of Rome partici pates largely in the ecclesiastical government, reserving to itself the confirmation of bishops and archbishops, and the regulation of all the taxes payable by churchmen. Still with the king rests the nomination of church dignitaries, and the reservation of a fourth part of their income. There are in Portugal two archbishops, thirteen bishops, and three ecclesiastical colleges. The number of parishes (4271) is large for so thinly peopled a country.

The Portuguese language bears a close resemblance to the Spanish. In it, as in the other southern tongues of Europe, the use of vowels is predominant. There are two universities in Portugal, that of Coimbra, founded in 1308, and attended by several hundred students; and the smaller one of Evora, founded in 1533. Lisbon has its royal academy, and the small town of Thomar an academy of sciences; but in general

literature and education are at a very low ebb. In the middle and latter part of the eighteenth century, partial improvements were introduced under the marquis of Pombal; and the censorship of the press is no longer in the hands of the clergy, but of a committee of the privy council: but politics have always been forbidden ground; though in philosophy, chemistry, natural history, and rural economy, the road is open, and a degree of encouragement is afforded by the government. There are in Portugal only three or four newspapers, and not so many scientific or critical journals. The pupils on the new plan of education of Bell and Lancaster were in 1820 about 5000 throughout the kingdom. Portugal has had a number of poets; but, with the exception of Camoens, they are almost entirely unknown in the other parts of Europe.

The forces, naval and military of Portugal, have in general been inefficient. A partial stimulus was given in 1760 to the Portuguese army, by a German commander, the count of Lippe; but after his death his plans were not followed up; and it was not till 1809 that the army, recruited by British funds, and disciplined by British officers, became such as to vindicate their former renown. This discipline is at present kept up. The naval force is less requisite, and that of Portugal does not exceed fifteen or eighteen frigates.

Each province in Portugal has its governor; and justice is administered in the first instance by the Juizes de Fora; appeals being made to the corregidors, and from these to the Casa de supplicaçao at Lisbon, and the Relaçao do porto at Oporto. Great abuses are said to exist in almost every department; the inadequacy of salaries leading to the acceptance of bribes. During the levy of 1809, numbers who ought to have marched were thus exempted by means of money, while others, lame and infirm, were, from the want of that medium, obliged to repair to the depôts. Of the prisons most are in a wretched state. In Lisbon a number of the cells, or rather dungeons, admit the water of the Tagus, and are regularly inundated to the depth of ten or twelve inches.

The pride of family is as great here as in any country: the higher classes are divided into the Titulados or high nobility, and the Fidalgos or gentry; but the characteristics of the provincial towns and peasantry differ in Portugal much more from those of the capital than in England. In the country the manners are in general primitive, and partake little of the luxury and corruption of the capital, but of the indolence and listlessness natural to thinly peopled districts, confirmed by the endless holidays of the Catholic church. Amidst all the drawbacks of the national character, it is satisfactory, however, to notice the general affability of superiors to their servants, who frequently pass a lifetime in one family. The Portuguese are, like the Spaniards, temperate; and, among the national amusements, the predilection for bull-fights is equally as great. A want of cleanliness is equally complained of in the capital and in the provincial towns. It is at least very perceptible in Oporto. Nothing also can be plainer, or in the eyes of an English traveller more indicative of poverty, than the furniture of a respectable family in Portugal. The chairs are of common deal, covered with leather; the few pictures in the house are on religious subjects, and inferior in execution to those on the sign-boards of our towns; but, in this luxurious climate, the chief enjoyment is out of doors, and a house is, much less than in Britain, an object of embellishment. In personal appearance, as in other respects, the Portuguese of the north take the lead of their southern countrymen.

Portugal, though still but a small kingdom, was originally much smaller. The Spanish and Portuguese historians agree, that Alonso king of Leon and Castile, and son to Ferdinand the Great, bestowed his daughter Theresa in marriage upon an illustrious stranger, Henry, and gave him with her the frontier province which he had conquered from the Moors, small, indeed, in extent, but excellently situated, and so pleasant and fertile that it has sometimes been styled Medulla Hispanica, or the marrow of Spain. To this territory was added the title of Count; but authors are divided about the time that this stranger came into Spain, and who he was. However, the writers of the Universal History make it pretty evident that he was a grandson of Robert, the first duke of Burgundy. The new sovereign, with his consort, fixed his residence in Guimaraez, on the banks of the river Ave. The remains of an ancient palace belonging to their successors are still to be seen; and, on account of its having been anciently the capital, the king, Denis, granted the inhabitants an immunity from taxes, which they still enjoy.

The Portuguese, now finding themselves independent, immediately began, like other nations, to attempt the subjection of their neighbours. Henry is said to have performed great exploits against the Moors; but the accounts are indistinct. He died in 1112, and was succeeded by his son Don Alonso, then an infant in the third year of his age.

In the minority of Alonso I. the kingdom was governed by his mother Theresa, assisted by two able ministers; but some differences took place between the queen regent and Urraca queen of Castile. Theresa insisted that some part of Galicia belonged to her by her father's will; and therefore seized on Tuy. Urraca, having assembled a numerous army, went in person into Galicia; upon which Theresa was obliged to abandon Tuy, and take shelter in one of her own fortresses. The consequences, in all probability, would have been fatal to the new kingdom, had not the archbishop of Compostella, without whose assistance Urraca could do nothing, demanded leave to retire with his vassals. This offended the queen to such a degree that she threw him into prison; which excited such a commotion among her own subjects that the Portuguese were soon delivered from their apprehensions. Queen Theresa fell immediately after into a similar error, by throwing into prison the archbishop of Braga. The bishop, however, was quickly liberated by a bull from the pope, who threatened the kingdom with an interdict. Soon after this

queen Urraca died, and all differences were amicably settled at an interview between Theresa and Don Alonso Raymond, who succeeded to the kingdom of Castile. The greatest misfortune which befel this princess was a quarrel with her own son Alonso Enriquez. A civil war ensued, in which the queen's forces were totally defeated, and herself made prisoner, in which situation she continued during the remainder of her life.

Alonso, having obtained possession of his dominions, made several attempts upon Galicia, but without success; so that he was at last constrained to make peace with Alonso, the king of Castile and Leon, who had assumed the title of Emperor of the Spains; more especially as his dominions were invaded by the Moors. A plague breaking out in the Moorish army, they were obliged to retreat; after which Alonso reduced several places belonging to that nation: but, in the mean time, the emperor Alonso, breaking into the Portuguese territories, destroyed every thing with fire and sword. The king of Portugal surprised and cut off a considerable part of his army; which, however, did not hinder the emperor from marching directly towards him. It was only at the intercession of the pope's legate that all differences were accommodated, and a peace concluded. In the mean time, the progress of the Christian arms in Spain being reported to Abu-Ali Texefien, the chief monarch of the Moors in Barbary, he directed Ishmael, his lieutenant in Spain, to assemble all the forces in the southern provinces, and drive the Christians beyond the Douro. Ishmael immediately began to put these orders in execution; and, having added a considerable body of troops brought from Barbary to those whom he had raised in Spain, the whole army was numerous. He was met by Alonso of Portugal, in the plains of Ourique, on the banks of the river Tayo; and Ishmael took all possible means to prevent the Christians from passing that river. The Portuguese forces were inconsiderable in number in comparison of the Moors; but Ishmael, being confident of victory, divided his army into twelve bodies, and disposed them in such a manner as might best prevent the flight, not sustain the attack, of the Christians. The consequence was, that his army was overthrown with incredible slaughter, and a vast number of prisoners taken, among whom were 1000 Christians, of the sect styled Mozarabians, whom, at the request of Theotonus, prior of the Holy Cross, Alonso set at liberty with their wives and children. After this victory, gained in 1139, Alonso was proclaimed king by his soldiers, and ever after renounced all subjection to the crown of Spain.

Being desirous, however, of bringing down the power of the emperor, he entered into a league with Raymond count of Barcelona and regent of Arragon, against that prince. In consequence of this, he entered Galicia with a considerable force on one side, while Raymond did the same on the other. But the Portuguese monarch, in his expedition into Galicia, received a dangerous wound, and had some of the nobility who attended him taken prisoners. At the same time, he heard that the Moors had invaded his dominions, so that he was obliged to retire; which, however, did not prevent the strong fortress of Leyria from falling into their hands. This they demolished, and put all the garrison to the sword; the king, however, caused it to be rebuilt. The war continued with various success till 1145, when the king projected an enterprise against Santaren, a strong city about twelve miles from Lisbon; which he took, and thus gained a considerable tract of country, and a strong barrier. After this success, Alonso caused himself with much ceremony to be crowned king of Portugal, before an assembly of the states, where he again solemnly renounced all dependence on the crown of Spain. The next year he undertook the recovery of Lisbon out of the hands of the Moors, with a small army; and, while he was making but little progress, a fleet of adventurers, French, English, Germans, and Flemings, who were going to the Holy Land, anchored in the mouth of the Tagus, whose assistance he demanded. This was readily granted; and, with their assistance, Lisbon was reduced; a conquest which so much raised the reputation of this monarch, and brought such numbers to recruit his army, that before the end of 1147 he had reduced twelve other considerable cities. For many years after this, Alonso was successful in all his undertakings. He settled the internal government of his kingdom, procured a bull from pope Alexander III. confirming his regal dignity, undertook many successful expeditions against the Moors, and became master of four of the six provinces which compose the present kingdom of Portugal. He was greatly assisted, it is said, by the counsels of his queen Matilda, by whom he had a numerous offspring, particularly three daughters; the eldest of whom, Matilda, was married to the king of Arragon; the second, Urraca, to Ferdinand king of Leon; and the third, Theresa, to Philip earl of Flanders.

In 1166 the king invaded the dominions of his son-in-law Ferdinand; and took Limmia and Turen, two cities of Galicia, in which he put strong garrisons, and in 1167 marched with a numerous army towards Badajos, which he invested; on the news of which Ferdinand, who had assembled a large army at Ciudad Rodrigo, marched to its relief. Yet, before he could come within sight of it, it had surrendered to the king of Portugal; upon which Ferdinand resolved to besiege his antagonist; which Alonso perçeiving, endeavoured to draw out his forces into the field. Though he was then upwards of seventy years of age, he was himself on horseback, and, pushing forwards at the head of his horse to get out at the gate, struck his leg against one of the bolts with such violence, that the bone was shattered to pieces. This accident occasioned such confusion that the Portuguese were easily beaten, and Alonso taken prisoner. The king of Leon behaved towards him with the greatest respect. He desired him to lay aside all thoughts of business, and attend to his wound; but, finding him restless and impatient, he assured him that he expected nothing more than to have things put into the same condition as before the war. To this Alonso readily assented; but, returning to his dominions before his cure was perfected was lame all the est of his life. Notwithstand-

ing this inconvenience, his courage transported him into the field whenever he was called by the interest of his subjects. Towards the end of his reign, an opportunity seemed to present itself of obtaining once for all an entire release from the disagreeable pretensions of the king of Leon, who, it seems, had insisted on his father-in-law doing homage for his kingdom. The opportunity which now presented itself, was a quarrel between the king of Leon and his nephew Alonso of Castile. The latter asked assistance from the king of Portugal, which was readily granted. But Ferdinand having received intelligence that the infant Sancho, the king's eldest son, was advancing towards Ciudad Rodrigo, assembled his troops on that frontier with such diligence that he was enabled to attack him unexpectedly, and entirely defeated him. Understanding, however, that Sancho was recruiting his forces, he sent him word that they might be much better employed against the infidels. Sancho made a proper use of this advice; and, after making some motions to amuse the enemy, made a sudden irruption into Andalusia, penetrating as far as Triana, one of the suburbs of Seville. The Moors assembled their forces in order to attack him on his retreat; but Sancho, having first fatigued them by the celerity of his march, at length chose a strong camp, and, having given his troops time to repose, drew them out, and offered the enemy battle. The Moors accepted the challenge, but were entirely defeated; and Sancho returned into Portugal with spoils to an immense amount. For some years after the war was continued without any remarkable event; but in 1184, Joseph, king of Morocco, having already transported multitudes of men from Barbary, at length followed in person with a prodigious army, and carried all before him as far as the Tayo. He appeared before the city of Santaren; but, having wearied and reduced his army by unsuccessful assaults on that place, he was attacked by the Portuguese forces, assisted by Ferdinand of Leon, entirely defeated, and himself killed. By this victory, the Portuguese were left at liberty to improve the interior part of their country, and fortify their frontiers; and, during this interval, the king died in 1185, in the seventy-sixth year of his age.

Alonso II. was succeeded by his son Sancho I. Of this prince it is remarkable that, before he ascended the throne, he was of a restless and warlike disposition; but no sooner did he come to the throne than he became a lover of peace, and began with great assiduity to repair the cities that had suffered by the war, and to re-people the country. By his steady attention to this he in a very short time quite altered the appearance of his territories, and procured to himself the title of the restorer of cities, and father of his country. In 1189 a fleet, composed for the most part of English vessels, but having on board a great number of adventurers of other nations, bound to the Holy Land, entered the river of Lisbon. They were very kindly received, and supplied with all kinds of refreshments by Sancho, who took this opportunity of soliciting them to assist him in a design he had formed, of attacking Silves, in Algarve; to which they readily yielded. Having joined a squadron of his own galleys, and marched a body of troops by land, the place was reduced, and the English, according to agreement, rewarded with the plunder. But in a short time, the Moors from Africa having again invaded Portugal, the town was several times taken and retaken, till at last Sancho, being sensible of the difficulties that would attend the keeping of it, caused it to be demolished. His last enterprise was the reduction of Elvas; soon after which he died, with the reputation of the best economist that ever sat on the throne of Portugal. He had amassed a treasure of more than 700,000 crowns in ready money, besides 1400 merks of silver, and 100 of gold plate, which he disposed of some time before his death; and was interred by his own command with little pomp, in the cathedal of Coimbra. From this period, the history of Portugal affords scarcely any event of importance, till the year 1289; when, in the reign of Dionysius, or Denis, a difference commenced with Castile which subsisted for a long time. Reconciliations frequently took place; but these were either of very short duration, or never sincere. At length, in the reign of John I., John II. of Castile, who had also pretensions to the crown of Portugal, invaded that kingdom at the head of the whole force of his dominions. According to the Portuguese historians, he besieged Elvas without effect; which disappointment enraged him to such a degree that he determined next year to invade Portugal a second time, and ruin all the country. Accordingly, having collected an army of 30,000 men, he took and ruined several places, while John lay inactive, with a small army, waiting for some English succors. At last he ventured an engagement with the forces which he had; and, notwithstanding the great superiority of the enemy, obtained a complete victory; after which he made an irruption into Castile, and gained another battle, which fixed him firmly on the throne of Portugal. The Castilians were obliged to consent to a truce of three years, which was soon after improved into a lasting peace. In 1414 king John undertook an expedition against the Moors in Barbary, where he commanded in person. The expedition proved successful, and the city of Ceuta was taken from the Moors at the first assault: but scarcely had the king left the country, when the princes of Barbary formed a league for the recovery of it; and, though they were at first defeated by the princes of Portugal, yet the trouble of keeping it was so great that some of the council were of opinion the town should be demolished. John, however, determined to keep the city; and therefore enlarged and strengthened the fortifications. He died in 1428 or 1433.

John II. was succeeded by his eldest son Edward. He undertook an expedition against Tangier in Barbary: but the event proved unfortunate. The king's son, Don Ferdinand, was left as a hostage for the delivery of Ceuta; but was, with the utmost cruelty and injustice, left in the hands of the infidels, by the king and council. Many preparations indeed were made for recovering the prince; but before any thing could be accomplished the king died in 1430,

which put an end to these designs. The war with Barbary continued at intervals, but with little success on the part of the Portuguese; and till 1497 there is no event of any consequence recorded in the history of Portugal. This year was remarkable for the discovery of the passage to the East Indies by the Cape of Good Hope, by Vasco de Gama; and at this period Portugal possessed an uncommon spirit of commercial enterprise; and an intelligent monarch, who selected the most active and able agents for carrying his patriotic plans into execution. As great things perhaps were at this period achieved by them as were ever accomplished by a nation in so short a time. Within twenty-four years after the voyage of Gama, the Portuguese had rendered themselves masters of the city of Malacca, in which the great staple of the trade carried on among the inhabitants of all those regions in Asia which Europeans have distinguished by the general name of the East Indies was then established. This conquest secured to them great influence over the interior commerce of India; while, at the same time, by their settlements at Goa and Diu, they were enabled to engross the trade of the Malabar coast, and to obstruct greatly the long established intercourse of Egypt with India by the Red Sea. In every part of the east they were received with respect: in many they acquired absolute command. Pursuing their trade without rival or control, they prescribed to the natives the terms of their mutual intercourse; they often set what price they pleased on the goods which they purchased; and were thus enabled to import from Hindostan and the regions beyond whatever was useful, rare, or agreeable, in greater abundance than had ever been known formerly in Europe. In consequence of this, the Venetians soon began to feel that decrease of their Indian trade which they had foreseen and dreaded. To prevent the farther progress of this, they incited the Sultan of the Mamelukes to fit out a fleet in the Red Sea, and to attack those unexpected invaders of a gainful monopoly, of which he and his predecessors had long enjoyed undisturbed possession. The Portuguese, however, encountered his formidable squadron with undaunted courage, entirely defeated it, and remained masters of the Indian Ocean. They continued their progress in the east almost without obstruction, until they established there an empire; to which, whether we consider its extent, its opulence, the slender power by which it was formed, or the splendor with which the government of it was conducted, there had hitherto been nothing comparable in the history of commercial nations. Emanuel, who laid the foundation of this stupendous fabric, had the satisfaction to see it completed. Every part of Europe was supplied by the Portuguese with the productions of the east; and if we except some inconsiderable quantities of them, which the Venetians still continued to receive by the ancient channels of conveyance, our quarter of the globe had no longer any commercial intercourse with India, and the regions of Asia beyond it, but by the Cape of Good Hope. In September 1522 Emanuel died of an epidemical fever, and was succeeded by his son John III.

The most remarkarkable transaction of this prince's reign was the introduction of the inquisition into his dominions. This happened in 1525 or, according to some writers, in 1535. In the mean time Solyman the Magnificent, the most enlightened monarch of the Ottoman race, observing the rising power and opulence of the Portuguese, and eager to supplant them, sent orders to the bashaw of Egypt to employ his whole strength against the Christians in the East. The bashaw, in obedienbe to these orders, sailed from the Red Sea with a greater naval force than ever the Mahometans had employed before; having 4000 Janissaries, and 16,000 other troops on board. Yet, by the courage and conduct of the Portuguese officers and soldiers, this mighty armament was defeated, and their East India possessions saved from the danger which threatened them. In Africa likewise the king of Fez was baffled before the town of Sasi. For a long time indeed the safety of the Portuguese in Africa had been derived only from the quarrels of the Moors; for such was the envy and jealousy which reigned among themselves, that they could never unite heartily in opposing the common enemy. The consequence was, that King John began to apprehend that the conquest of Barbary was impossible, and therefore, to limit his desires to the keeping of those fortresses which he had already. On the other hand, he exerted himself in the settlement of the Brasils, which he brought into a very good state, causing several strong towns to be erected, and many of the natives to profess Christianity. He fell, however, into a kind of apoplexy, which cut him off in June 1557; and was succeeded by his grandson Sebastian III. an infant of three years of age.

After the death of John, the administration remained in the hands of the queen, grandmother to Sebastian, who conducted herself with great prudence and address. The Moors, however, now laid close siege to Masagnan; but the queen regent sent such speedy succors, that, though they brought 80,000 men into the field, the infidels were obliged to abandon the enterprise. At last, finding that her popularity was declining, she resigned her authority into the hands of cardinal Henry, the king's brother. By him that prince's education was entrusted to the priests, who, by instilling false ideas of glory into his mind, paved the way for the catastrophe that followed. When Sebastian was grown up to man's estate, he panted to distinguish himself against the infidels. He proposed an expedition to the East Indies; but the prime minister Alcocova substituted Africa in its stead. This expedition the king entered into in the most romantic manner. He first sent over Don Antonio prior of Crato, with a few hundred soldiers; then carried his principal courtiers over with him from a hunting match, and such troops as he could collect on so short warning; and, when all these were assembled, the king spent his time in hunting and slight excursions against the enemy, without doing any thing of consequence, except exposing his person. At length he returned in such tempestuous weather that his subjects had given him up for lost. These accidents did not discourage Sebastian. On the contrary

he attempted a new expedition on account of Muley Hamet, king of Fez, who had been expelled from his dominions by his uncle Muley Moloch, Hamet having restored the fort of Araila, which his father had taken from the Portuguese; though earnestly and anxiously dissuaded from the measure by the queen dowager, by Philip of Spain, and all his most zealous friends. On the 24th of June 1577, therefore, he sailed from Lisbon with a fleet of fifty ships and five galleys; twelve cannon; and transports and tenders, making in all 1000 sail. His troops were 9000 Portuguese foot, 3000 Germans, 700 Italians under Sir Thomas Stukely, a brave English exile; 2000 Castilians, and 300 volunteers, under Don Christopher de Turara. He touched at Lagos Bay, in Algarve, where he spent four days; and was magnificently entertained by the duke of Medina Sidonia. The king ordered Don Diego de Souza to follow him with the rest of the army. They accordingly landed at Arzila on the African coast, where the king was met by Muley Hamet, who delivered his son as a hostage, and brought a reinforcement of 300 Moors. Here it was resolved to reduce the town of Larache; but the king and Muley Hamet differing on the question whether the troops should proceed by land or sea, Muley left him, and the king proceeded on the 29th July by land. Mean time Muley Moloch, though ill of a fever, came forward at the head of 60,000 horse and 40,000 foot, and advanced with such celerity that he came in sight of the Portuguese army on the 3d of August. On the measures now to be adopted Sebastian and his ally again differed; but the king's opinion, to engage immediately, was resolved on. The Portuguese advanced with the greatest resolution; broke the first line of the Moorish infantry, and disordered the second. Muley Moloch, upon this, exerting himself beyond his strength, fell from his horse, and, though one of his guards carried him to his litter, expired on reaching it. By this time the Moorish cavalry had wheeled round and attacked the Christians in the rear, broke the Portuguese on the right, and in this interim Muley Hamet, in passing a rivulet, was drowned. The Germans, Italians, and Castilians, fought well, but the Portuguese acted indifferently; and the whole army, except about fifty men, were either killed or taken prisoners. The fate of Sebastian is variously related. He is said to have had two horses killed under him and mounted a third. His bravest officers fell in his defence, and at last he was overpowered and killed by the Moors. But his death was long doubted.

By this disaster, the kingdom of Portugal, from ranking with the most eminent, sunk at once into the lowest rank of the European states. All the young nobility were cut off, or carried into slavery, and the kingdom was exhausted of men and treasure, so that cardinal Henry, who assumed the government after the death of his nephew Sebastian, found himself in a very disagreeable situation. The transactions of his reign were not important; but after his death, in 1580, a great revolution took place. The crown of Portugal was claimed by three different competitors; viz. the prince of Parma, the duchess of Braganza, and Philip II. of Spain. Whatever might have been the merits of their respective claims, the power of Philip quickly decided the contest. His schemes were facilitated by the treachery of the regents, who took the most scandalous methods of putting the kingdom into his hands, so that, finding every thing in his favor, he commanded the duke of Alva to invade Portugal at the head of 20,000 men. In vain did the people, perceiving that they were betrayed, exclaim against their governors, and place on the throne Antonio, prior of Crato. His forces being inexperienced, and he himself but a weak leader, he was quickly defeated by the duke of Alva, and forced to fly from the kingdom. On his flight the whole kingdom submitted, together with the garrisons in Barbary, the settlements on the west coast of Africa, of Brasil, and in the East Indies. The Madeiras, however, except the isle of St. Michael, held out for Antonio. Philip made his entry into Lisbon as soon as the kingdom was reduced, and endeavoured to conciliate the affections of the people by tendering a solemn oath to maintain the privileges and liberties of the people; and engaging that the viceroy or chief governor should be a native, unless the king should give that charge to one of the royal family.

These concessions, however, did not answer the purpose; nay, though Philip was to the last degree lavish of honors and employments, the Portuguese were dissatisfied. The exiled prince, in the mean time, still styled himself king of Portugal. At first he retired to France, where he found so much countenance that with a fleet of nearly sixty sail, and a body of troops, he made an attempt upon the Terceras; but his fleet was beaten by the Spaniards; and, a great number of prisoners being taken, all the officers and gentlemen were beheaded, and a number of the inferior ranks hanged. Antonio, notwithstanding, kept possession of some places, coined money, and performed other acts of regal power; but was at length constrained to return into France. He passed thence into England, where he was well received; and, after king Philip had ruined the naval power of Portugal, as well as Spain, by equipping the armada, our queen Elizabeth made no difficulty of owning and assisting Antonio, and even of sending Sir John Norris and Sir Francis Drake with a strong fleet and a great army to restore him. Upon this occasion Antonio sent his son Don Christopher, a hostage to Muley Hamet, king of Fez and Morocco, who was to lend him 200,000 ducats. But king Philip prevented this by surrendering Arzilla: and this disappointment, the unseasonable enterprise upon Corunna, and the dispute that arose between Norris and Drake, rendered that expedition abortive. Antonio remained some time in England; but withdrew once more into France, where he fell into great distress; and at length died, in the sixty-fourth year of his age. He left several children, who, on account of his being a knight of Malta, and having made a vow of virginity at his entrance into the order, were looked upon as illegitimate. He preserved to the last a great interest in Portugal; and drew thence, in the course of his life, im-

mense sums of money. In the interior the Portuguese, partly through their love of their prince, and partly from their hatred to the Castilians, were continually in the hopes that king Sebastian would re-appear and deliver them; and in this respect such a spirit of credulity reigned, that it was said proverbially, they would have taken a negro for Sebastian. This humor led the son of a tiler at Alcohaza, who had led a profligate life, to give himself out for that prince; and having associated himself with two companions, one of whom styled himself Don Christopher de Tavora, and the other the bishop of Guarda, they began to collect money, and were in a fair way of creating much disturbance, when the cardinal archduke caused them to be apprehended. The false Sebastian was led ignominiously through the streets of Lisbon, and sent to the galleys for life, and the pretended bishop was hanged. Not long after, Gonsalo Alvarez, the son of a mason, gave himself out for this same prince, and having promised marriage to the daughter of Pedro Alonsa, a rich yeoman, whom he created earl of Torres Novas, he assembled a body of about 800 men, and some blood was spilt before he was apprehended: at length, being proved to be an impostor, himself, and his intended father-in-law, were hanged and quartered at Lisbon. There was another person who appeared about twenty years after the fatal defeat of Sebastian, at Venice, who created still more trouble. He assumed the name of Sebastian, and gave so very distinct an account of the manner in which he had passed his time from the defeat of that prince, that, after twenty-eight examinations before a committee of noble and impartial persons, they showed no disposition to declare him an impostor. The noise of this was diffused throughout Europe, and the enemies of Spain endeavoured everywhere to give it credit. The Venetian senate, however, refused to discuss the great point, whether he was or was not an impostor, unless they were requested so to do by some state in alliance with them. Upon this the prince of Orange sent Don Christopher, the son of the late Don Antonio, to make that demand; and at his request an investigation was entered with great solemnity: but no decision followed; only the senate set him at liberty, and ordered him to depart their dominions in three days. He was, after various adventures, shipped on board a galley as a slave; then carried to St. Lucar, where he was some time confined; thence he was transferred to a castle in the heart of Castile, and never heard of more. Some persons were executed at Lisbon for their endeavours to raise an insurrection in his behalf: but it was thought strange policy in the court of Spain, to make this affair so public without proofs; and the attempt to silence this claim by affirming the party to be a magician was thought ridiculous enough. The administration of affairs in Portugal during the reign of Philip was every way detrimental to the nation. His preparations for the invasion of England impoverished all his European dominions; but it absolutely exhausted Portugal. To pacify the Portuguese, the king borrowed money from the nobility upon the customs, and the branches, thus mortgaged, became fixed and hereditary; so that the merchant was oppressed, and the king received nothing. This expedient failing, others were fallen upon, which made way for diverting other branches; for instance, that for the repair of fortifications, the money being strictly levied, and the works suffered to decay; while, upon the whole, in the space of eighteen years, the nation was visibly impoverished; yet the government of Philip was incomparably better than that of his successors; so that his death was regretted; and the Portuguese at last confessed, that of bad masters he was the best.

His son Philip, the II. of Portugal and the III. of Spain, sat twenty years upon the throne before he made a visit to Portugal, where the people incurred an enormous expense to receive him, and thus gave him a false idea of their wealth. He held an assembly of the states, in which his son was sworn successor. The reign of Philip III. and IV. was a series of bad measures, and worse fortune; all their dominions suffered greatly; Portugal most of all. The loss of Ormus in the East, and of Brasil in the West Indies, together with the shipwreck of a fleet sent to escort that from Goa, brought the nation incredibly low. These are the heads only of the transactions for forty years; to enter into the particulars would require to point out the breaches made by the Spanish ministers on the conditions granted by king Philip; which, with respect to them, was the unalterable constitution of Portugal while subject to the monarchs of Castile; and which, notwithstanding, they so often and so flagrantly violated. The general assembly of estates was to be held frequently, yet they were held only thrice in sixty years; and of these twice within the first three. The king was to reside in this realm as often and as long as possible; yet Philip I. was there but once, Philip II. only four months, and Philip III. never at all. The council of Portugal, which was to be composed entirely of natives, was filled with Castilians, as the garrisons also were, though the contrary had been promised, and the council finally reduced from five to three, then two, and at last to a single person. By these, and many other grievances, too tedious to mention, the detestation of the Spanish government became universal; and in 1640 a revolution took place, in which John duke of Braganza was declared king, by the title of John IV.

This revolution, being effected in accordance with the almost unanimous feelings of the nation, was attended with very little effusion of blood; neither were all the efforts of the king of Spain able to reinstate his authority. Several attempts indeed were made for this purpose. The first battle was fought in 1644, between a Portuguese army of 6000 foot and 1100 horse, and a Spanish army of nearly the same number, when the latter were entirely defeated. King John carried on a defensive war during the remainder of his life; but after his death, in 1655, the war was renewed with great vigor. This was what the Spaniards did not expect. It is not indeed easy to conceive a kingdom left in more perilous circum-

stances than Portugal was at this time. The young king Alonzo Henry was a child not above thirteen years of age, and reputed of no very sound constitution in body or mind; the regency was vested in the queen dowager, a Castilian; the nation was involved in a war, and this respecting the title to the crown; the nobility, some of them secretly disaffected to the reigning family, and almost all of them embarked in feuds and contentions with each other, so that the queen scarce knew whom to trust. She acted, however, with great vigor and prudence. By marrying her only daughter, the princess Catharine, to Charles II. king of Great Britain, the queen procured to Portugal the protection of the English fleet, with reinforcements of some thousands of horse and foot; and at last, in 1665, terminated the war by the glorious victory of Montesclaros. This decisive action broke the power of the Spaniards, and fixed the fate of the kingdom, though not of the king, of Portugal. Alonzo was a prince whose education had been neglected, and who was devoted to vulgar amusements, and whom the queen, for these reasons, wished to deprive of the crown, that she might place it on the head of his younger brother Peter. To accomplish this purpose she attempted every method of stern authority and secret artifice. But the Portuguese would not consent to set aside the rights of primogeniture, and involve the kingdom in all the miseries attending a disputed succession. After the death, however, of the queen mother, the infant entered into cabals against the king of a much more dangerous nature. Alonzo had married the princess of Nemours; but that lady had transferred her affection to Peter, to whom she lent her unnatural assistance. Alonzo was compelled therefore to sign a resignation of the kingdom; and his brother, after governing a few months without legal authority, was in a meeting of the states unanimously proclaimed regent. Soon after this iniquitous revolution, the marriage of the king and queen was declared null by the chapter of Lisbon; and the regent, by a papal dispensation, and with the consent of the states, espoused the worthless woman who had been his brother's wife. He governed under the appellation of regent fifteen years; when, upon the death of the king, he mounted the throne by the name of Peter II.; and, after a long reign of great prudence and vigor, he died on the 9th December, 1706. John V. succeeded his father; and, though he was then little more than seventeen years of age, acted with such wisdom and resolution, and adhered so steadily to the grand alliance formed against France and Spain, that, though he suffered severe losses during the war, he obtained such terms of peace at Utrecht that Portugal was in all respects a gainer by the treaty. The two crowns of Spain and Portugal were not, however, thoroughly reconciled till 1737; but from this period they became every day more united. In this situation of things a treaty was made in 1750 with the court of Madrid, by which Nova Colonia, on the Plata, was yielded to his catholic majesty, to the great regret of the Portuguese, as well on account of the value of that settlement as because they apprehended their possession of the Brasils would by this action be rendered precarious. On the 31st of July, the same year, John V. worn out by infirmities, died in his sixty-first year and forty-fourth of his reign.

Joseph, prince of the Brasils, succeeded him, to the universal satisfaction of his subjects. Amongst other new regulations, the power of the inquisition suffered considerable restriction; the king directing that none of their sentences should be put in execution till reviewed and approved by the privy council. But, as in the reign of his father he had consented to the treaty with Spain, he ratified it after his accession. However, within the space of a few years, the calamities of Portugal, and those of Lisbon in particular, could scarcely be paralleled in history. An earthquake, a fire, a famine, a plot to assassinate their prince, executions upon executions, the scaffolds and wheels of torture reeking with the noblest blood; imprisonment after imprisonment of the greatest and most distinguished personages; the expulsion of a chief order of ecclesiastics; the invasion of the kingdom by a powerful, strong, and exasperated nation; the numerous troops of the enemy laying waste their territory, bringing fire and sword almost to the gates of their capital; the king ready almost to fly. The Spanish ministry had already decreed the doom of Portugal, and nothing was to be heard at the Escurial but Delenda est Carthago. Carthaginian or Jewish story may afford a scene like this, but for the shortness of the period not one marked by more important events. From the result anticipated by Spain, under the hand of Providence, the generosity of Great Britain alone preserved the Portuguese. See Great Britain, vol. x. p. 457. Joseph died in 1777.

Joseph dying without male issue, the succession devolved to Mary his daughter, the late queen of Portugal. She was married before he died, by the pope's dispensation, to his brother prince Peter. Joseph, prince of Brasil, the son of this connexion, was married to his youngest aunt! On the 3d of March, 1801, Spain declared war against Portugal. On the 26th April a counter proclamation of war was made by Portugal. By the 6th June the Spaniards had reduced Elvas, Campo Major, Arroches, Fior de Rosa Estrencoz, Olivenza, and all the magazines of Alentejo. On the 6th June peace was made by the cession of the town and province of Olivenza to Spain.

In the beginning of 1808, the French, by an arrangement made with the Spanish government, took possession of Portugal; previous to which the court, by the aid of the British fleet, sailed for the Brasils. Soon after Buonaparte entrapped the Spanish court and royal family, and made them prisoners at Bayonne. He seized Spain, and conferred the crown on his brother Joseph. This detestable trick excited a spirit in Spain which all the tyrant's power was not able to subdue. During 1808, 1809, and 1810, Portugal was the chief scene of the military contest between Great Britain and France. It seems, like Spain, to have survived the tyranny of Buonaparte, to be delivered over to a worse.

The steps of the late revolutionary and usurping movements of Don Miguel and his associates

have been preparing for a length of time. We may thus trace the outline of the most interesting events in the modern history of Portugal:—

In 1816 John VI. refused to return to Lisbon, whither a squadron under Sir John Beresford had been sent to convey him; partly, it is said, because he was displeased at the disregard of his rights shown by the congress of Vienna; partly because the unpopularity of the commercial treaty had alienated him from England; but probably still more because he was influenced by the visible growth of a Brasilian party which now aimed at independence. Henceforward, indeed, the separation of Portugal from Brasil manifestly approached. The Portuguese of Europe began to despair of seeing the seat of the monarchy at Lisbon; the regency there were without strength, all appointments were obtained from the distant court of Rio Janeiro; men and money were drawn away for the Brasilian war on the Rio de la Plata; the army left behind was unpaid; in fine, all the materials of formidable discontent were heaped up in Portugal, when the Spanish revolution broke out in the beginning of 1820. Six months elapsed without a spark having reached Portugal, when marshal Beresford went to Rio Janeiro to solicit the interference of the king; but that prince made no effort to prevent the conflagration, and perhaps no precaution would then have been effectual. In August 1820 the garrison of Oporto declared for a revolution; and, being joined on their march to the capital by all the troops on their line, were received with open arms by the garrison of Lisbon; and it was determined to bestow on Portugal a still more popular constitution than that of Spain. With what prudence the measures of the popular leaders in the south of Europe were conceived or conducted it is no part of our present business to enquire. Many friends of freedom remonstrated at the time against their errors. The people of Portugal indeed, unless guided by a wise and vigorous government, were destined by the very nature of things, in any political change made at that moment, to follow the course of Spain. The regency of Lisbon, by the advice of a Portuguese minister, at once faithful to his Sovereign, and friendly to the liberty of his country, made an attempt to stem the torrent, by summoning an assembly of the Cortes. The attempt was too late; but it pointed to the only means of saving the monarchy. The same minister, on his arrival in Brasil, at the end of 1820, advised the king to send his eldest son to Portugal as viceroy, with a constitutional charter, in which the legislature was to be divided into two chambers, and composed as in that of 1826. He also recommended an assembly of the most respectable Brasilians at Rio Janeiro to organise their affairs. But a revolution in that capital soon precipitated affairs; and the popular party, headed by Don Pedro, the king's eldest son, declared for the constitution of Portugal and the separation of Brasil at once. This, in April, 1821, drove the old king to Europe. But on the voyage he was advised to stop at the Azores, where he might negociate with more independence: but he rejected this counsel; and on his arrival in the Tagus, on the 3d of July 1821, nothing remained but a surrender to the people at discretion. The revolutionary Cortes were as tenacious of the authority of the mother country as the royal administration; and they accordingly recalled the heir apparent to Lisbon. But the spirit of independence arose among the Brasilians, who, encouraged by the example of the Spanish Americans, presented addresses to the prince beseeching him not to yield to the demands of the Portuguese assembly, who desired to make him a prisoner, as they had made his father; but, by assuming the crown of Brasil, to provide for his own safety, as well as for their liberty. In truth it is evident that he neither could have continued in Brasil without acceding to the popular desire, nor have then left it without insuring the destruction of monarchy in that country. He acquiesced therefore in the prayer of these petitions; the independence of Brasil was proclaimed; and the Portuguese monarchy thus finally dismembered.

In the summer of 1823 the advance of the French army into Spain excited a revolt of the Portuguese royalists; and now the infant Don Miguel, the king's second son, attracted notice, by appearing at the head of a battalion who declared against the constitution; and the inconstant soldiery, equally ignorant of the object of their revolts against the king or the Cortes, were easily induced to overthrow their own slight work.

After a short interval the possessors of authority relapsed into the ancient and fatal error of their kind;—that of placing their security in maintaining *unbounded* power. A resistance to the constitution, which grew up in the interior of the court, was fostered by foreign influence; and, after a struggle of some months, prevented the promulgation of a charter well considered and digested.

In April 1824 part of the garrison of Lisbon surrounded the king's palace, and hindered the access of his servants to him; some of his ministers were imprisoned; and the diplomatic body, including the papal nuncio, the French ambassador, and the Russian as well as English minister, were the only means at last of restoring him to some degree of liberty, which was however so imperfect that, by the advice of the French ambassador, the king took refuge on board of an English ship of war in the Tagus, where he was at length able to re-establish his authority. Over the part in these transactions into which Don Miguel rushed it is hardly required that we should throw a veil, in imitation of his father, who forgave these youthful faults as 'involuntary errors.' At last the king issued a proclamation, on the 4th of June 1824, for restoring the ancient constitution of the Portuguese monarchy, with assurances that an assembly of the cortes, or three estates of the realm, should be speedily held with all their legal rights, and especially with the privilege of laying before the king, for his consideration, the heads (or chapters) of such measures as they might deem necessary for the public good, for the administration of justice, and for the redress of grievances, whether public or private. To that assembly was referred the consideration of the periodical meetings of succeeding cortes, and 'the means of progressively ameliorating the administration of the state.'

Immediately after the counter revolution in 1823, John VI. sent a mission to Rio Janeiro, requiring the submission of his son and his Brasilian subjects. But, whatever might be the wishes of Don Pedro, he had no longer the power to transfer the allegiance of a people who had tasted independence. Don Pedro could not restore to Portugal her American empire; but he might easily lose Brasil in the attempt. A negociation was opened at London, in the year 1825, under the mediation of Austria and England. It was evident that no amicable issue of such a negociation was possible, which did not involve acquiescence in the separation of the two countries.

A treaty was finally concluded on the 29th of August 1825, by Sir Charles Stuart, recognising the independence and separation of Brasil, acknowledging the sovereignty of that country to be vested in Don Pedro; allowing the king of Portugal also to assume the imperial title; binding the emperor of Brasil to reject the offer of any Portuguese colony to be incorporated with his dominions; and containing some other stipulations usual in treaties of peace. This treaty was ratified at Lisbon, on the 5th November 1825, by letters patent, from which, at the risk of some repetition, it is necessary to extract two clauses, of which the decisive importance will be shortly seen. 'I have ceded and transferred to my beloved son Don Pedro de Alcantara, heir and successor of these kingdoms, all my rights over that country, recognising its independence with the title of empire. We recognise our said son, Don Pedro de Alcantara, prince of Portugal and the Algarves, as emperor, and having the exercise of sovereignty in the whole empire.'

On the 10th of March, 1826, John VI. died at Lisbon. On his deathbed, however, he made provision for the temporary administration of the government. By a royal decree of the 6th of March he committed the government to his daughter, the Infanta Donna Isabella Maria, assisted by a council during his illness, or, in the event of his death, till 'the legitimate heir and successor to the crown should make other provision in this respect.' The regency was immediately installed, and universally obeyed at home, as well as acknowledged, without hesitation or delay, by all the powers of Europe. The princess regent acted in the name, and on the behalf of her brother, Don Pedro. Not a voice was raised in any corner of Europe against his hereditary right. It was impossible that the succession of any prince to a throne could be more quiet and undisputed.

The regency, without delay, notified the demise of the late king to their new sovereign: and here the difficulties of that prince's situation began to show themselves. Though the treaty had not weakened his hereditary right to Portugal, yet the main object of it was to provide, not only for the independence of Brasil, but for its 'separation' from Portugal, which undoubtedly imported a separation of the crowns. Possessing the government of Brasil, and inheriting that of Portugal, he became bound by all the obligations of the treaty between the two states. Though he inherited the crown of Portugal by the laws of that country, yet he was disabled by treaty from permanently continuing to hold it with that of Brasil. But if, laying aside unprofitable subtleties, we consult only conscience and common sense, we shall soon discover that these rights and duties are not repugnant, but that, on the contrary, the legal right is the only means of peforming the federal duty. The treaty did not expressly determine which of the two crowns Don Pedro was bound to renounce; it therefore left him to make an option between them. A breach in the order of succession became inevitable, either in Portugal or Brasil. Necessity required the deviation. But the same necessity vested in Don Pedro, as a king and a father, the power of regulating, in this respect, the rights of his family; and the permanent policy of monarchies required that he should carry the deviation no farther than the necessity.

Don Miguel had no right which was immediately involved in the arrangement to be adopted; and it is acknowledged that the two daughters of John VI., married and domiciled in Spain, had lost their rights as members of the royal family. Neither the queen, nor indeed any other person, had a legal title to the regency, which in Portugal, as in France and England, was a case omitted in the constitutional laws; and, as no Cortes had been assembled for a century, could only be provided for by the king, who, of necessity, was the temporary lawgiver. The only parties who could be directly affected by the allotment of the two crowns were the children of Don Pedro, the eldest of whom was in her sixth year. It was absolutely necessary that Don Pedro should retain the powers of a king of Portugal, until he had employed them for the quiet and safety of both kingdoms, as far as these might be endangered by the separation. He held that crown as a trustee for the execution of the treaty, and left Donna Maria in undisputed possession.

The Infanta Donna Maria de Gloria, heiress to the Portuguese throne, visited the English court, and renewed the friendly relations of her family with that court, while the regent, Don Miguel, boldly usurped the throne, and was proclaimed king of Portugal in 1828. The treachery of Miguel was, however, soon chastised, and the usurper expelled from the throne by Don Pedro, who came from Brazil to restore his daughter to her dominions. In 1833, Don Miguel was compelled to withdraw totally from the kingdom of Portugal.

PORTULACA, purslane, a genus of the monogynia order, and dodecandria class of plants; natural order thirteenth, succulentæ: COR. pentapetalous: CAL. bifid: CAPS. unilocular, and cut round. There are several species, but the two following are the most remarkable:—

1 P. anacampseros, perennial, or shrubby cape purslane, rises with a shrubby branchy stalk, about six inches high, with oval, gibbous, succulent leaves, and the stalks terminated by small clusters of red flowers. Both these plants are of a succulent nature: the first is an

herbaceous annual, for culinary uses; and the second a shrubby perennial, raised by the curious for variety. They are both exotics of a tender quality, of the temperature of greenhouse or stove plants. The common culinary purslane is raised annually from seed for summer use, and is an excellent ingredient in summer salads, but improper for winter on account of its cold moist nature. The plant, being tender, must be raised either on a hot-bed or in a warm border; in which last it will not succeed before April or May. The shrubby sort must be kept in the hot-house, in pots of a dry soil.

2. P. coleracea, annual or common culinary purslane, rises with herbaceous, low, succulent, branchy stalks, six or eight inches high, garnished with wedge-shaped, thick, succulent leaves, and small close-setting flowers. There are two varieties; one with deep green leaves, the other with yellow leaves; both of which rise from the same seed.

PORTUMNA, a town of Ireland, in the county of Galway and province of Connaught, seventy-four miles from Dublin. The castle of Portumna, the seat of the earl of Clanricarde, is at this place, and near it are the ruins of an ancient castle. There is also a garrison for a troop of horse and two companies of foot. The town is seated near the river Shannon, where it falls into Lough Derg. The Cistercian monks had a chapel here: the walls are still nearly entire; and the ancient choir is now the parish church.

PORTUMNUS. See MELICERTA.

PORUS, in ancient mythology, the god of plenty, worshipped at Rome. He was the son of Metis, the goddess of prudence.

PORUS, an Indian monarch, who opposed Alexander the Great, but was defeated by him. When brought before the Macedonian, he was asked 'how he wished to be treated?'—'Like a king,' replied Porus; and accordingly Alexander not only restored all his dominions, but gave him several additional territories; in consequence of which Porus continued his most faithful ally till his death. Porus is said to have been a man of uncommon stature and strength.

POR'WIGLE, *n. s.* A tadpole or young frog not yet fully shaped.

That black and round substance began to grow oval, after a while the head, the eyes, the tail to be discernible, and at last to become that which the ancients called gyrinus, we a *porwigle* or tadpole.
Browne's Vulgar Errours.

POSE', *v. a.* } Sax. ᵹepose. An old word
PO'SER, *n. s.* } signifying heaviness or stupefaction.—Skinner. To puzzle; gravel; put to a stand or stop: one that asks posing questions.

She in the presence of others *posed* him and sifted him, thereby to try whether he were indeed the very duke of York or no. *Bacon.*

He that questioneth much, shall learn much; but let his questions not be troublesome, for that is fit for a *poser*. *Id.*

Learning was *posed*, philosophy was set,
Sophisters taken in a fisher's net. *Herbert.*

How God's eternal son should be man's brother,
Poseth the proudest intellectual power. *Crashaw.*

The only remaining question to me I confess is a *posing* one. *Hammond.*

As an evidence of human infirmities, I shall give instances of our intellectual blindness, not that I design to *pose* them with those common enigmas of magnetism. *Glanville.*

Particularly in learning of languages, there is least occasion for *posing* of children. *Locke on Education.*

It leaves no reader at a loss,
Or *posed*, whoever reads;
No commentator's tedious gloss,
Nor even index needs. *Cowper.*

POSEN, GRAND DUCHY OF, a province of Prussia, comprising that part of Poland which was restored to her by the treaty of Vienna. It is bounded on the east by the new kingdom of Poland, and on the south and west by Silesia and Brandenburgh, and is of an oblong form, with a long projection, to the south-east. It contains about 12,000 square miles. It is divided into the governments of Posen and Bromberg, and is included in the same military division as Silesia. Population amounts to 1,164,000.

The soil, like that of Poland, generally is light; in some places there are tracks of heath; in others marshes; but very few parts are incapable of cultivation, or even of yielding a considerable return. It is watered by the Netz, the Wartha, the Obra, the Brahe; and the canal of Bromberg, which makes the influence of the vicinity of Germany to be here sensibly felt: and the duchy of Posen is much less backward than the country to the east. In the towns the number of Germans is considerable; and various foreign colonists have settled here at different times. When the intolerance of the Austrian government compelled a great number of Protestants to emigrate from Silesia, this country, from its vicinity, afforded the manufacturers a retreat, and they introduced here their capital and industry. Ever since 1792 the Prussian government has made efforts to attract foreigners here, granting them several substantial immunities; and the manufactures of woollen, linen, leather, and other articles continue to be well kept up. The exports consist of these, corn, cattle, tallow, hides, wool, and the smaller articles of wax, honey, hogs' bristles, feathers, &c.

POSEN, GOVERNMENT OF, is the name of one of the two governments into which the grand duchy is divided. It comprehends the south and south-west parts of the province, with an area of 6900 square miles, and 545,000 inhabitants, and is divided into the following circles:—

Posen,	Kosten,	Krotoszyn,
Obernik,	Kraben,	Peisern,
Meseritz,	Szrem,	Adelnau,
Bomst,	Szroda,	Schildberg
Fraustadt,		

POSEN, or POSNAN, the capital of Prussian Poland, and a bishop's see, stands at the confluence of the Proszna and Wartha. It is a place of considerable antiquity, having been once the capital of Poland. The bishopric, the earliest in Poland, was founded in the tenth century; and, when the Hanseatic confederacy was formed, Posen became one of its members. It appears that several families from England and Scotland settled here at a remote date, and part of the

inhabitants still claim their descent from them. Posen is surrounded with a mound and ditch, and built with regularity. Its public edifices are an old cathedral and council-house, guard house, and the building that was the Jesuits' college. Here also is a theatre, a theological seminary, gymnasium, and a school for midwifery. The manufactures, which are on a small scale, are of linen, leather, and watches; also fire arms. The sale and purchase of goods is chiefly managed by Jews. The chief articles of export are corn, wool, and timber: the last being sent by water as far as Stettin. At midsummer, the great fair of Posen is attended by the landholders of all the adjacent country. As to religion, the majority are Catholics, but the Protestants and Jews are in considerable numbers; and the latter occupy a particular quarter of the town, although the inhabitants are not above 20,000.

The situation of Posen exposes it to inundations; and its two suburbs are situated among marshes. This town suffered in the war between Sweden and Poland, between the years 1708 and 1711, both from fire and pestilence. It fell under Prussia in 1772. In 1803 the whole of the Jews' quarter was burned down. In 1806, after the battle of Jena, it was entered by the French, and afterwards added by Buonaparte to the duchy of Warsaw; but in 1815 was restored to Prussia. 144 miles east of Berlin, and 166 west of Warsaw.

POSIDONIUS, an ancient philosopher of Apamea, who lived at Rhodes, and afterwards came to Rome, where he cultivated the friendship of Cicero and Pompey. He attempted to measure the circumference of the earth; he accounted for the tides from the motion of the moon; and he calculated the height of the atmosphere to be 400 stadia.

POS'ITED, *adj.* }
POSI'TION, *n. s.* } Lat. *positus.* Placed; deposited; ranged: position is state of being
POSI'TIONAL, *adj.* }
placed; site; situation; principle laid down: positional, respecting position.

Of any offence or sin therein committed against God, with what conscience can ye accuse us, when your own *positions* are, that the things we observe should every one of them be dearer unto us than ten thousand lives? *Hooker.*

Iron having stood long in a window, being hence taken, and by the help of a cork balanced in water, where it may have a free mobility, will bewray a kind of inquietude till it attain the former *position*. *Wotton.*

That the principle that sets on work these organs is nothing else but the modification of matter, or the natural motion thereof thus or thus *posited* or disposed, is most apparently false. *Hale.*

A fallacious illation is to conclude from the *position* of the antecedent unto the *position* of the consequent, or the remotion of the consequent to the remotion of the antecedent. *Browne.*

The leaves of cataputia or spurge plucked upwards or downwards, performing their operations by purge or vomit, as old wives still do preach, is a strange conceit, ascribing unto plants *positional* operations. *Id. Vulgar Errours.*

They are the happiest regions for fruits, by the excellence of soil, the *position* of mountains, and the frequency of streams. *Temple.*

Since no one sees all, and we have different prospects of the same thing, according to our different *positions* to it, it is not incongruous to try whether another may not have notions that escaped him. *Locke.*

By varying the *position* of my eye, and moving it nearer to or farther from the direct beam of the sun's light, the colour of the sun's reflected light constantly varied upon the speculum as it did upon my eye. *Newton's Optics.*

Let not the proof of any *positions* depend on the *positions* that follow, but always on those which go before. *Watts.*

POS'ITIVE, *adj.* }
POS'ITIVELY, *adv.* } Fr. *positif*; Lat. *positus.* Real; absolute;
POS'ITIVENESS, *n. s.* } direct; capable of being
POSITIV'ITY. } affirmed; not negative
or implied; dogmatic; settled; enactive: positively follows these senses: positiveness and positivity mean actualness; reality; peremptoriness; confidence.

Although no laws but *positive* be mutable, yet all are not mutable which be *positive*; *positive* laws are either permanent or else changeable, according as the matter itself is, concerning which they were made. *Hooker.*

It is well and truly said in schools, in sin there is nothing *positive*; but it is a want of that which ought to be, or subsist, partly in the nature of man, and partly in the actions of nature. *Perkins.*

Give me some breath, some little pause,
Before I *positively* speak in this. *Shakspeare.*

The power or blossom is a *positive* good, although the remove of it, to give place to the fruit, be a comparative good. *Bacon.*

The good or evil, which is removed, may be esteemed good or evil comparatively, and not *positively* or simply. *Bacon.*

Laws are but *positive*; love's power, we see,
Is nature's sanction, and her first decree.
Dryden.

It was absolutely certain that this part was *positively* yours, and could not possibly be written by any other. *Id.*

Whatsoever doth or can exist, or be considered as one thing, is *positive*: and so not only simple ideas and substances, but modes also are *positive* beings, though the parts of which they consist are very often relative one to another. *Locke.*

The *positiveness* of sins of commission lies both in the habitude of the will and in the executed act too; whereas the *positiveness* of sins of omission is in the habitude of the will only. *Norris.*

I would ask a man, that has but once read the bible, whether the whole tenor of the divine law does not *positively* require humility and meekness to all men. *Sprat.*

I am sometimes doubting, when I might be *positive*, and sometimes confident out of reason. *Rymer.*

The law is called *positive*, which is not inbred, imprinted, or infused, into the heart of man, by nature or grace; but is imposed by an external mandate of a lawgiver, having authority to command. *White.*

This peremptoriness is of two sorts; the one a magisterialness in matters of opinion, the other a *positiveness* in relating matters of fact; in the one we impose upon men's understandings, in the other on their faith. *Government of the Tongue.*

It is impossible that any successive duration should be actually and *positively* infinite, or have infinite successions already gone and past. *Bentley.*

Some *positive* persisting fops we know,
That, if once wrong, will needs be always so;
But you, with pleasure, own your errors past,
And make each day a critick on the last. *Pope.*

Not to consent to the enacting of such a law, which has no view besides the general good, unless another law shall at the same time pass, with no other view but that of advancing the power of one party alone; what is this but to claim a *positive* voice, as well as a negative? *Swift.*

Courage and *positivity* are never more necessary than on such an occasion; but it is good to join some argument with them of real and convincing force, and let it be strongly pronounced too. *Watts.*

Where men of judgment creep and feel their way,
The *positive* pronounce without dismay;
Their want of light and intellect supplied
By sparks absurdity strikes out of pride. *Cowper.*

POSITIVE ELECTRICITY. See ELECTRICITY.

POS'ITURE, *n. s.* Lat. *positura.* The manner in which any thing is placed.

Supposing the *posture* of the party's hand who did throw the dice, and supposing all other things, which did concur to the production of that cast, to be the very same they were, there is no doubt but in this case the cast is necessary. *Bramhall.*

POS'NET, *n. s.* Fr. *bassinet.* Skinner. A little basin; a porringer; a skillet.

To make proof of the incorporation of silver and tin in equal quantity, and also whether it yield no soiliness more than silver; and again, whether it will endure the ordinary fire, which belongeth to chaffing-dishes, *posnets,* and such other silver vessels. *Bacon.*

POS'SE, *n. s.* Lat. *posse.* An armed power. From posse comitatûs, the power of the shires. A low word.

The *posse* comitatûs, the power of the whole county, is legally committed unto him. *Bacon.*

As if the passion that rules, were the sheriff of the place, and came off with all the *posse,* the understanding is seized. *Locke.*

POSSE COMITATUS, in law, signifies the power of the county, or the aid and assistance of all the knights, gentlemen, yeomen, laborers, servants, apprentices, &c., and all others within the county that are above the age of fifteen, except women, ecclesiastical persons, and such as are decrepit and infirm. This posse comitatus was to be raised where a riot is committed, a possession kept upon a forcible entry, or any force of rescue used contrary to the king's writ, or in opposition to the execution of justice; and it is the duty of all sheriffs to assist justices of the peace in the suppression of riots, &c., and to raise the posse comitatus, or to charge any number of men for that purpose.

POSSESS', *v. a.*
POSSESS'ION, *n. s.* & *v. a.*
POSSESS'IONER, *n. s.*
POSSESS'IVE, *adj.*
POSSESS'ORY,
POSSESS'OR, *n. s.*

Fr. *posseder;* Lat. *possessor.* To own; enjoy; occupy; have power over, or disposal of: hence to deliver over; give possession, or command of (taking *of* or *with*); affect by inward or concealed power: possession is ownership; property; the state of having in one's own hands, power, or use; effect of being possessed, as the madness caused by an unclean spirit: as an obsolete verb active, to invest with property: possessioner and possessor are both obsolete words for master; owner; proprietor: possessive and possessory, having possession.

And whanne the younge man had herde these wordis he wente away sorowful for he hadde many *possessions.* *Wiclif. Matt.* xix.

He shall inherit her, and his generation shall hold her in *possession.* *Ecclus.* iv. 16.

They were people, whom having been of old freemen and *possessioners,* the Lacedemonians had conquered. *Sidney.*

She will not let instructions enter
Where folly now *possesses.*
Shakspeare. Cymbeline.

Record a gift,
Here in the court, of all he dies *possessed,*
Unto his son. *Id. Merchant of Venice.*

This man, whom hand to hand I slew in fight,
May be *possessed with* some store of crowns.
Shakspeare.

He's *possest with* greatness,
And speaks not to himself, but with a pride
That quarrels at self-breath. *Id.*

Let not your ears despise my tongue,
Which shall *possess* them *with* the heaviest sound
That ever yet they heard. *Id.*

The English marched towards the river Eske, intending to *possess* a hill called Under-Eske.
Hayward.

Sundry more gentlemen this little hundred *possesseth* and *possessioneth.* *Carew.*

Inspired within, and yet *possessed* without.
Cleaveland.

This he detains from the ivy much against his will; for he should be the true *possessory* lord thereof.
Howel.

Seem I to thee sufficiently *possessed*
Of happiness or not, who am alone
From all eternity? *Milton's Paradise Lost.*

What fury, O son,
Possesses thee, to bend that mortal dart
Against thy father's head? *Id.*

In *possession* such, not only of right,
I call you. *Milton.*

Thou profoundest hell
Receive thy new *possessor.* *Id.*

Beware what spirit rages in your breast;
For ten inspired, ten thousand are *possest.*
Roscommon.

I hope to *possess* chymists and corpuscularians *of* the advantages to each party, by confederacy between them. *Boyle.*

A considerable difference lies between the honour of men for natural and acquired excellencies and divine graces, that those having more of human nature in them, the honour doth more directly redound to the *possessor* of them. *Stillingfleet.*

Do nothing to lose the best *possession* of life, that of honour and truth. *Temple.*

Whole houses, *of* their whole desires *possest,*
Are often ruined at their own request. *Dryden.*

The intent of this fable is to *possess* us *of* a just sense of the vanity of these craving appetites.
L'Estrange.

A man has no right over another's life, by his having a property in land and *possessions.* *Locke.*

This *possesses* us *of* the most valuable blessing of human life, friendship. *Government of the Tongue.*

We *possessed* ourselves *of* the kingdom of Naples, the dutchy of Milan, and the avenue of France in Italy. *Addison.*

It is of unspeakable advantage to *possess* our minds *with* an habitual good intention, and to aim all our thoughts, words, and actions at some laudable end.
Id

Endowed with the greatest perfections of nature, and *possessed of* all the advantages of external condition, Solomon could not find happiness. *Prior.*

'Twas the interest of those, who thirsted after the possessions of the clergy, to represent the *possessors* in as vile colors as they could. *Atterbury's Sermons.*

With the rage of all their race *possest*,
Stung to the soul, the brothers start from rest. *Pope.*

I think that the man is *possessed*. *Swift.*

Think of the happiness of the prophets and apostles, saints, and martyrs, who are now rejoicing in the presence of God, and see themselves *possessors* of eternal glory. *Law.*

POSSESSIO FRATRIS, in law, is where a man has a son and a daughter by one venter or wife, and a son by another venter, and dies; if the first son enter, take possession, and die without issue, the daughter shall have the land as heir to her brother; but if the eldest son die without issue, not having made an actual entry and seisin, the younger brother by the second wife, as heir to the father, shall enjoy the estate, and not the sister.

POSSESSION BAY, a bay on the north coast of the island of Georgia, observed by captain Cook in 1775. The head of it, he says, although it was then the summer season, as well as the places on each side, was terminated by high perpendicular ice-cliffs. The inner parts of the country were not less savage and forbidding. The wild rocks raised their lofty summits to the clouds, and the valleys lay clothed with everlasting snow. Long. 37° 18′ W., lat. 54° 5′ S.

POSSESSION BAY, a bay in the straits of Magellan. The point lies in long. 69° 39′ W., lat. 52° 20′ S.; and a reef of rocks runs off from it for about a mile. The soundings are irregular, but the anchorage is good.

POSSESSION ISLAND, an island in the South Pacific, near the north point of New Holland, where captain Cook hoisted the English colors, and took possession of all the east or north-east coast of New Holland, with all bays, harbours, rivers, and islands, situated on it, in the name of the king of Great Britain. Twenty miles north of York Cape. Long. 218° 21′ W., lat. 10° 33′ S.

POSSESSION, POINT, a cape on the west coast of North America, and east of Cook's inlet; so called because here Mr. King, lieutenant to captain Cook, took possession of the river and country in the name of George III. of England, on the 10th of June, 1778. The natives appeared similar to those of Prince William's Sound.

POSSESSION, in English law, is either actual, where a person actually enters into lands or tenements descended or conveyed to him; or where lands are descended to a person, and he has not yet entered into them. A long possession is much favored by the law as an argument of right, even though no deed can be shown, and it is more regarded than an ancient deed without possession. If he that is out of possession of land bring an action, he must prove an undeniable title to it; and when a person would recover any thing of another, it is not sufficient to destroy the title of the person in possession without he can prove that his own right is better than his. To make possession lawful upon an entry, the former possessor and his servants are to be removed from off the premises entered on: but a person by lease and release is in possession without making any entry upon the lands.

POSSESSIVE, in grammar, a term applied to nouns, which denotes the enjoyment or possession of any thing, either in particular or in common; as meus, mine; tuus, thine.

PO'SSET, *n. s.* Lat. *posca*. Milk curdled with wine or any acid.

We'll have a *posset* at the latter end of a sea-coal fire. *Shakspeare.*

Swift as quicksilver it courses through
The natural gates and alleys of the body;
And, with a sudden vigour, it doth *posset*
And curd, like eager droppings into milk,
The thin and wholesome blood. *Id. Hamlet.*

In came the bridemaids with the *posset*,
The bridegroom eat in spite. *Suckling.*

A sparing diet did her health assure;
Or sick, a pepper *posset* was her cure. *Dryden.*

The cure of the stone consists in vomiting with *posset* drink, in which althea roots are boiled. *Floyer.*

Increase the milk when it is diminished by the too great use of flesh meats, by gruels and *posset* drink. *Arbuthnot.*

I allowed him medicated broths, *posset* ale, and pearl julep. *Wiseman's Surgery.*

POSSEVIN (Anthony), a Jesuit, born at Mantua, in 1533. He was employed by Gregory XIII. in embassies to Poland, Sweden, and Germany; and wrote a number of works on theology. He died at Ferrara, in 1611.

POS'SIBLE, *adj.*
POSSIBIL'ITY, *n. s.*
POS'SIBLY, *adv.*
Fr. *possible*; Lat. *possibilis*. Practicable; having the power to be or to be done; not contrary to the nature of things: the noun substantive and adverb corresponding.

With men this is impossible, but with God all things are *possible*. *Matthew*, xix. 26.

All things are *possible* to him that believeth. *Mark.*

There is no let, but that as often as those books are read, and need so requireth, the stile of their differences may expressly be mentioned to bar even all *possibility* of error. *Hooker.*

Within the compass of which laws, we do not only comprehend whatsoever may be easily known to belong to the duty of all men; but even whatsoever may *possibly* be known to be of that quality. *Id.*

Admit all these impossibilities and great absurdities to be *possible* and convenient. *Whitgift.*

Brother, speak with *possibilities*,
And do not break into these woeful extremes. *Shakspeare.*

When we have, for the proof of any thing, some of the highest kinds of evidence, and in this case it is not the suggestion of a mere *possibility* that the thing may be otherwise, that ought to be any sufficient cause of doubting. *Wilkins.*

He must not stay within doors, for fear the house should fall upon him, for that is *possible*: nor must he go out, lest the next man that meets him should kill him, for that is also *possible*. *Id.*

Possibly he might be found in the hands of the earl of Essex, but he would be dead first. *Clarendon.*

Firm we subsist, but *possible* to swerve. *Milton.*
Can we *possibly* his love desert? *Id.*

A bare *possibility* that a thing may be or not be, is no just cause of doubting whether a thing be or not. *Tillotson.*

It will scarce seem *possible*, that God should engrave principles in men's minds in words of uncertain signification. *Locke.*

According to the multifariousness of this imitability, so are the *possibilities* of being. *Norris.*

Consider him antecedently to his creation, while he yet lay in the barren womb of nothing, and only in the number of *possibilities*; and consequently could have nothing to recommend him to Christ's affection. *South.*

Arbitrary power tends to make a man a bad sovereign, who might *possibly* have been a good one, had he been invested with an authority circumscribed by law. *Addison.*

Example not only teaches us our duty, but convinces us of the *possibility* of our imitation. *Rogers.*

POSSIDONIUS, a philosopher of Alexandria, who flourished after Eratosthenes, and before Ptolemy. He is by some confounded with Possidonius of Apamea.

POSSO (Andrew), an eminent painter of landscapes, history, and portraits, born at Trent in 1642. His paintings are very beautiful. He was also an author, and wrote some excellent tracts on perspective.

POST, *v. a.* Fr. *poste, poster*; Ital *posto*; Lat. *positus, postis*. Situation; station; place: seat; office; employment; military station; a piece of timber erected: to place; station; fix; register (as in a book of accounts); delay; to fix opprobriously on posts, or in a conspicuous situation.

The blood they shall strike on the two side *posts* and upper *post* of the house. *Exodus* xii. 7.

I have not stopt mine ears to their demands,
Nor *posted* off their suits with slow delays;
Then why should they love Edward more than me? *Shakspeare.*

Fir-trees, cypresses, and cedars being, by a kind of natural rigour, inflexible downwards, are thereby fittest for *posts* or pillars. *Wotton's Architecture.*

Many gentlemen, for their integrity in their votes, were, by *posting* their names, exposed to the popular calumny and fury. *King Charles.*

It is a goodly sight to behold things proceeding orderly; to see every person quietly resting in his *post*, or moving evenly in his rank. *Barrow.*

The conscious priest, who was suborned before,
Stood ready *posted* at the postern door. *Dryden.*

See before the gate what stalking ghost,
Commands the guard, what sentries keep the *post*. *Id.*

Every man has his *post* assigned to him, and in that station he is well, if he can but think himself so. *L'Estrange.*

He that proceeds upon other principles in his enquiry into any sciences, puts himself on that side, and *posts* himself in a party, which he will not quit till he be beaten out. *Locke.*

The waters rose every where upon the surface of the earth; which new *post*, when they had once seized on, they could never quit. *Burnet.*

When a man is *posted* in the station of a minister, he is sure, beside the natural fatigue of it, to incur the envy of some, and the displeasure of others. *Addison's Freeholder.*

As I watched the gates,
Lodged on my *post*, a herald is arrived
From Cæsar's camp. *Id. Cato.*

Without letters a man can never be qualified for any considerable *post* in the camp; for courage and corporal force, unless joined with conduct, the usual effects of contemplation, are no more fit to command than a tempest. *Collier.*

You have not *posted* your books these ten years; how should a man keep his affairs even at this rate? *Arbuthnot.*

On pain of being *posted* to your sorrow,
Fail not, at four, to me. *Granville.*

Whatever spirit, careless of his charge,
His *post* neglects, or leaves the fair at large,
Shall feel sharp vengeance. *Pope.*

Many thousands there are who determine the justice or madness of national administrations, whom neither God nor men ever qualified for such a *post* of judgment. *Watts.*

Post is equivocal; it is a piece of timber, or a swift messenger. *Id. Logick.*

POST, *n. s.* & *v. n.*, POST'AGE, *n. s.*, POST'BOY, POST'HASTE, POST'HORN, POST'OFFICE, POST'HORSES, } Fr. *poste*; Ital. *posta*. A carrier or messenger; one who travels with speed; quick manner of travelling: to travel speedily or hastily: postage is money paid for conveying letters: postboy, a boy that rides post: a posthorn announces the arrival of letters by a public post, and the post-office receive and distribute them: post-horses are those used in travelling post.

He lay under a tree, while his servants were getting fresh *posthorses* for him. *Sidney.*

The Turkish messenger presently took horse which was there in readiness for him, and *posted* towards Constantinople with as much speed as he could. *Knolles.*

I fear my Julia would not deign my lines,
Receiving them by such a worthless *post*. *Shakspeare.*

I brought my master news of Juliet's death,
And then *in post* he came from Mantua
To this same monument. *Id. Romeo and Juliet.*

I *posted* day and night to meet you. *Shakspeare.*

Post speedily to my lord, your husband,
Shew him this letter. *Id. King Lear.*

Weird sisters hand in hand,
Posters of the sea and land,
Thus to go about. *Id. Macbeth.*

This is
The source of this our watch, and the chief head
Of this *posthaste* and romage in the land. *Shakspeare.*

He cannot live, I hope; and must not die,
Till George be packed with *posthorse* up to heaven. *Id.*

I came yonder at Eaton to marry Mrs. Ann Page; and 'tis a *postmaster's* boy. *Id.*

Themistocles made Xerxes *post* apace out of Greece, by giving out that the Grecians had a purpose to break his bridge of ships athwart the Hellespont. *Bacon's Essays.*

A cripple in the way out-travels a footman, or a *post* out of the way. *Ben Jonson's Discovery.*

Espying the French ambassador with the king's coach attending him, made them balk the beaten road and teach *posthackneys* to leap hedges. *Wotton.*

In certain places there be always fresh *posts* to carry that farther which is brought unto them by the other. *Abbot.*

This man tells us, that the world waxes old though not in *posthaste*. *Hakewill on Providence.*

Then this, then that man's aid, they crave, implore;
Post here for help, seek there their followers. *Daniel.*

Thousands at his bidding speed,
And *post* o'er land and ocean without rest.
Milton.

He who rides *post* through an unknown country, cannot distinguish the situation of places. *Dryden.*

Fifty pounds for the *postage* of a letter; to send by the Church is the dearest road in Christendom. *Id.*

No wonder that pastorals are fallen into disesteem; I see the reader already uneasy at this part of Virgil, counting the pages, and *posting* to the Æneis. *Walsh.*

This genius came thither in the shape of a *postboy*, and cried out that Mons was relieved. *Tatler.*

Without this letter, as he believes that happy revolution had never been effected, he prays to be made *postmaster* general. *Spectator.*

This only object of my real care,
In some few *posting* fatal hours is hurled
From wealth, from power, from love, and from the world. *Prior.*

If you don't send to me now and then, the *post-office* will think me of no consequence; for I have no correspondent but you. *Gay to Swift.*

I send you the fair copy of the poem on dulness, which I should not care to hazard by the common *post.* *Pop .*

If you are sent to the *postoffice* with a letter, put it in carefully. *Swift.*

An officer at the *posthouse* in London places every letter he takes in, in the box belonging to the proper road. *Watts.*

By the correspondence which his place in the *post-office* facilitated, he procured country newspapers and sold their intelligence to a journalist in London, for a guinea a week. *Johnson.*

But let eternal infamy pursue
The wretch to nought but his ambition true,
Who, for the sake of filling with one blast
The *post-horns* of all Europe, lays her waste.
Cowper.

Post, in military affairs, any place where soldiers are stationed. Thus the detachments established in front of the army are termed the out-posts; the stations on the wings of the army are said to be the posts of honor, as being the most conspicuous and most exposed. But in the operations of a campaign, a post properly signifies any spot of ground capable of lodging soldiers, or any situation, whether fortified or not, where a body of men may make a stand and engage the enemy to advantage. The use of them is chiefly felt in a defensive war against an invading enemy; as by carrying on a war of posts in a country where this can be done to advantage, the most formidable army may be so harassed and reduced that all its enterprises may be rendered abortive. Indeed, in modern times, pitched battles have become much more rare than formerly, manœuvring and securing of posts being considered as the most essential objects in the conduct of a campaign. In the choice of a post, the general rules to be attended to are, that it be convenient for sending out parties to reconnoitre, surprise, or intercept the enemy; that if possible it have some natural defence, as a wood, a river, or a morass, in front or flank, or at least that it be difficult of access, and susceptible of speedy fortification; that it be so situate as to preserve a communication with the main army, and have covered places in the rear to favor a retreat; that it command a view of all the approaches to it, so that the enemy cannot advance unperceived and rest concealed, while the detachment stationed in the post are forced to remain under arms; that it be not commanded by any neighbouring heights; and that it be proportioned in extent to the number of men who are to occupy and defend it. It is not to be expected that all these advantages will often be found united; but those posts ought to be selected which offer the greatest number of them.

Post Office. This important office for the conveyance of letters through the kingdom, as well from foreign parts as from place to place within Great Britain, was attempted to be erected by the parliament in 1643; an office was erected first in 1657, and after the restoration established by stat. 12 Car. II. c. 35. See Blackstone 1 Comm. 321.

The rates of letters have been from time to time altered, and some further regulations added by stats. 9 Ann. c. 10; 6 Geo. I. c. 21; 26 Geo. II. c. 13; 5 Geo. III. c. 25; 7 Geo. III. c. 50; 28 Geo. III. c. 9; 39 Geo. III. c. 76; 41 Geo. III. (U. K.) c. 7; 42 Geo. III. c. 81 and 101; 45 Geo. III. c. 11; 46 Geo. III. c. 73 and 92; 48 Geo. III. c. 116; 55 Geo. III. c. 87, and penalties are imposed in order to confine the carriage of letters to the public office only; except in some few cases. Rates of postage in postage in Ireland, are regulated by 54 Geo. III. c. 119; 55 Geo. III. c. 103. See also 43 Geo. III. c. 28, and Irish act 23, 24 Geo. III. c. 17.

The privilege of letters coming free of postage to and from members of parliament was claimed by the house of commons in 1660, but dropped on a private assurance that it should be allowed. A warrant accordingly used to be issued to the postmaster-general to allow the same; till at length it was expressly confirmed by stat. 4 Geo. III. c. 24; which, and stats. 24 Geo. III. stat. 2, c. 37; 35 Geo. III. c. 53, add many new regulations; rendered necessary by the great abuses crept into the practice of franking. This privilege of franking is still further regulated by stat. 42 Geo. III. c. 63; and 46 Geo. III. c. 61; and is by several acts extended to public offices and boards in particular government departments.

Our post office originally partook of the spy-like character of the present French establishment of this name. The preamble of the ordinance, made in 1657, states that the establishing one general post-office, besides the benefit to commerce, and the convenience of conveying public dispatches, 'will be the best means to discover and prevent many dangerous and wicked designs against the commonwealth:' and, strange to say, the policy of having the correspondence of the kingdom under the inspection of government is still continued; for by a warrant from one of the principal secretaries of state, letters may be detained and opened. 1 Comm. 322, edit. 1793, n. 28. But by stat. 9 Ann. c. 10, sect. 40, if any person shall, without such authority, wilfully detain or open any letter or packet delivered to the post-office, he shall forfeit £20, and be in-

capable of future employment in the post-office. —It has been decided that no person is subject to this penalty but those who are employed in the post-office, 5 Term Rep. 101. But see stat. 35 Geo. III. c. 62, and 17 Geo. III. stat. 2, c. 53, enabling the postmaster general to open and return letters to foreign parts in consequence of certain political emergencies.

By 7 Geo. III. c. 50, enforced by 42 Geo. III. c. 81, persons employed in the post-office secreting any letters containing securities for money, &c., are punished as felons without benefit of clergy; as are also persons procuring such offence. It seems that it is not a felony within 7 Geo. III. c. 50, sect. 1, for a person employed in the post-office, to steal out of a letter entrusted to his care a draft on a London banker, purporting to be drawn in London, but actually drawn about ten miles from London, on unstamped paper. It seems also that sect. 2 of the same act does not apply to persons employed in the post-office; and that such a person, therefore, who steals a letter out of the post-office, is not guilty of felony under that act. 3 Bos and Pull. 311.

No action can be maintained against the postmaster-general, for the loss of bills or articles sent in letters by the post. 1 Ld. Raym. 646; 1 Com. Rep. 100. Many attempts were formerly made by postmasters in country towns to charge ½*d.* and 1*d.* a letter on delivery, at the houses in the town, above the parliamentary rates; under the pretence that they were not obliged to carry the letters out of the office gratis. But it was repeatedly decided that such a demand is illegal, and that they are bound to deliver the letters to the inhabitants, within the usual and established limits of the town, without any addition to the rate of postage. Yet, by 46 Geo. III. c. 92, letters may be conveyed to and from places, not being post-towns, and charged with extra prices.

We have noticed the new building of this name under the article LONDON.

POSTDILU'VIAN, *adj.* Lat. *post* after, and *diluvium*, a flood. Posterior to the flood.

The antediluvians lived a thousand years; and as for the age of the *postdiluvians* for some centuries, the annals of Phœnicia, Egypt, and China, agree with the tenor of the sacred history. *Grew.*

Take a view of the *postdiluvian* state of this our globe, how it hath stood for these last four thousand years. *Woodward.*

POSTEL (William), a learned Rhemish enthusiast, was born in Normandy in 1510, and in his youth supported himself at the college of St. Barbe, as the servant of the other students. Francis I. afterwards sent him to the east to collect MSS., which commission he discharged with credit, and was appointed on his return professor of mathematics and languages. After this he fell into disgrace, and was obliged to leave France. He died in a monastery in 1581. Postel pretended to have died, and risen again with the soul of Adam; and called himself Postellus restitutus; he also maintained that, women shall have the dominion over men; and that his doctrines were revealed to him by Jesus Christ.

POSTE'RIOR, *adj.*
POSTERIOR'ITY, *n. s.*
POSTE'RIORS, *n. s. pl.*
POSTER'ITY,
Fr. *posterieur;* Lat. *posterior.* Happening after; placed after; following; backward: hence, in the noun-substantive plural, the backward part of the body: posterity, descendants; those who come after us.

It was said,
It should not stand in thy *posterity;*
But that myself should be the father
Of many kings. *Shakspeare. Macbeth.*

Where the anterior body giveth way, as fast as the *posterior* cometh on, it maketh no noise, be the motion never so great. *Bacon.*

Posterity informed by thee might know. *Milton.*

There must be a *posterity* in time of every compounded body, to these more simple bodies out of which it is constituted. *Hale.*

Although the condition of sex and *posteriority* of creation might extenuate the error of a woman, yet it was inexcusable in the man. *Browne.*

No care was taken to have this matter remedied by the explanatory articles *posterior* to the report. *Addison.*

Their names shall be transmitted to *posterity*, and spoken of through all future ages. *Smalridge.*

They were fallible, they were men; but if *posterity*, fallible as they, grow bold and daring, where the other would have trembled, let them look to it. *Waterland.*

And now had fame's *posterior* trumpet blown,
And all the nations summoned. *Pope.*
To the unhappy, that unjustly bleed,
Heaven gives *posterity* t' avenge the deed. *Id.*

To raise one hundred and ten thousand pounds is as vain as that of Rabelais, to squeeze out wind from the *posteriors* of a dead ass. *Swift.*

Hesiod was *posterior* to Homer. *Broome.*

This orderly disposition of things includes, the ideas of prior, *posterior*, and simultaneous. *Watts.*

PO'STERN, *n. s.* Fr. *pôterne;* Belg. *posterne;* Lat. *postica.* A small gate; a little door.

Ere dawning light
Discovered had the world to heaven wide,
He by a privy *postern* took his flight,
That of no envious eyes he mote be spyed. *Spenser.*

Go on, good Eglamour,
Out at the *postern* by the abbey wall. *Shakspeare.*

Great Britain hath had by his majesty a strong addition; the *postern*, by which we were so often entered and surprised, is now made up. *Raleigh.*

These issued into the base court through a privy *postern*, and sharply visited the assailants with halberds. *Hayward.*

By broken byways did I inward pass,
And in that window made a *postern* wide. *Fairfax.*

To what purpose are those strait and capital inhibitions of the return of our factious fugitives into this kingdom, if, while the wicked is shut upon them, that they should not come to us, the *postern* be open to us, that we may go to them. *Bp. Hall.*

The conscious priest, who was suborned before,
Stood ready posted at the *postern* door. *Dryden.*

If the nerves, which are the conduits to convey them from without to the audience in the brain, be so disordered as not to perform their functions, they have no *postern* to be admitted by, no other ways to bring themselves into view. *Locke.*

A private *postern* opens to my gardens,
Through which the beauteous captive might remove.
Rowe.

Thought, busy thought! too busy for my peace!
Thro' the dark *postern* of time long elapsed,
Led softly, by the stillness of the night. *Young.*

A Postern, in fortification, is usually made in the angle of the flank of a bastion, or in that of the curtain, or near the orillon, descending into the ditch; whereby the garrison can march in and out, unperceived by the enemy, either to relieve the works, or to make private sallies, &c. The word is also used in general for any private or back door.

POSTEXIS'TENCE, *n. s.* Post and existence. Future existence.

As Simonides has exposed the vicious part of women from the doctrine of pre-existence, some of the ancient philosophers have satirised the vicious part of the human species, from a notion of the soul's *postexistence.* *Addison.*

POST'HUMOUS, *adj.* Fr. *posthume*; Lat. *posthumus.* Done, had, or published, after one's death.

In our present miserable and undivided condition, how just soever a man's pretensions may be to a great or blameless reputation, he must, with regard to his *posthumous* character, content himself with such a consideration as induced the famous Sir Francis Bacon, after having bequeathed his soul to God, and his body to the earth, to leave his fame to foreign nations. *Addison.*

POSTICK, *adj.* Lat. *posticus.* Backward.

The *postick* and backward position of the feminine parts in quadrupeds can hardly admit the substitution of masculine generation. *Browne.*

POS'TIL, *v. a.* Fr. *postille*; Lat. *postella*, a gloss. To gloss; illustrate with marginal notes.

I have seen a book of account of Empson's, that had the king's hand almost to every leaf by way of signing, and was in some places *postilled* in the margin with the king's hand. *Bacon.*

Hence you fantastic *postillers* in song,
My text defeats your art, ties nature's tongue.
Cleaveland.

It hath been observed by many holy writers, commonly delivered by *postillers* and commentators.
Browne.

POSTI'LION, *n. s.* Fr. *postillon.* One who guides the first pair of a set of horses; one who guides any post-horses.

Let the *postilion* nature mount, and let
The coachman art be set. *Cowley.*

A young batchelor of arts came to town recommended to a chaplain's place; but, none being vacant, modestly accepted of that of a *postilion.*
Tatler.

Posting, or Travelling by Post, a particular mode of travelling. A person is said to travel post, when, in place of going on during his whole journey in the same vehicle and with the same horses, he stops at different stages to provide fresh horses, for the sake of greater convenience and expedition; and when therefore he takes a carriage expressly for himself instead of going by any regular coach. In tracing the origin of posts, it has been already remarked, that the more ancient establishments of this kind were fully as much for travelling stations as the conveyance of letters. The relays of horses provided at these public stations for the messengers of the prince were occasionally, by special license, allowed to be used by other travellers who had sufficient interest at court. Frequent demands of this nature would suggest the expedient of having in readiness supplies of fresh horses and carriages over and above what the public service required, to be hired out to other travellers on payment of an adequate price. We find, therefore, that in former times the post-masters alone were accustomed to let out horses for riding post, the rates of which were fixed in 1548 by a statute of Edward VI. at one penny per mile. In the statute re-establishing the post-office in 1660 it is enacted that none but the post-master, his deputies, or assigns, shall furnish post-horses for travellers; with a proviso, however, that, if he has them not ready in half an hour after being demanded, the traveller shall be at liberty to provide himself elsewhere. The same prohibition is contained in the act establishing the Scotch post-office in 1695, as well as in the subsequent act of queen Anne, erecting the general office for the united kingdom. It is doubtful, however, whether it ever was strictly enforced. By an explanatory act of 26 Geo. II. the prohibition is confined to post horses only, and every person declared to be at liberty to furnish carriages and horses to them of every kind for travellers. The increase of commerce, and necessity for a speedy communication between different parts of the kingdom, have brought stage-coaches into such general use that posting is seldom resorted to. The rate of posting now stands from 1*s.* to 1*s.* 3*d.* per mile, according as the season has been favorable to the production of fodder.

POSTLETHWAYT (Malachy), an eminent English lexicographer. He published The Universal Dictionary of Trade and Commerce; an extensive and comprehensive work, in 2 vols. large folio, London, dedicated to Sir Stephen Theodore Janssen, Bart. It went through several editions. He died in 1767.

POSTLIM'INOUS, *adj.* Lat. *postiliminium.* Done or contrived subsequently.

The reason why men are so short and weak in governing, is, because most things fall out to them accidentally, and come not into any compliance with their pre-conceived ends, but are forced to comply subsequently, and to strike in with things as they fall out, by *postliminous* after-applications of them to their purposes. *South.*

POSTMERID'IAN, *adj.* Lat. *postmeridianus.* In the afternoon.

Over-hasty digestion is the inconvenience of *postmeridian* sleep. *Bacon's Natural History.*

POSTPONE', *v. a.* Fr. *postposer*; Lat. *postpono.* To put off; to delay; set in value below another power or thing.

You would *postpone* me to another reign,
Til. when you are content to be unjust. *Dryden.*

All other considerations should give way, and be *postponed* to this. *Locke on Education.*

The most trifling amusement is suffered to *postpone* the one thing necessary. *Rogers.*

POST'SCRIPT, *n. s.* Lat. *post* and *scriptum.* The paragraph added to the end of a letter.

One, when he wrote a letter, would put that which was most material in the *postscript.* *Bacon.*

I think he prefers the public good to his private opinion; and therefore is willing his proposals should with freedom be examined; thus I understand his *postscript*. *Locke.*

The following letter I shall give my reader at length, without either preface or *postscript*. *Addison.*

Your saying that I ought to have writ a *postscript* to Gay's, makes me not content to write less than a whole letter. *Pope.*

POSTULATE, *v. a.* & *n. s.* }
POSTULA'TION, *n. s.* }
POS'TULATORY, *adj.* }
POSTULA'TUM, *n. s.* } Fr. *postuler*; Lat. *postulo*. To assume without proof; a postulate is an unproved assumption: postulation, the act of assuming without proof; postulatum is a single position of this kind: postulatory, assuming without proof.

A second *postulation* to elicit my assent, is the veracity of him that reports it. *Hale.*

They most powerfully magnify God, who, not from *postulated* and precarious inferences, entreat a courteous assent, but from experiments and undeniable effects. *Browne.*

This we shall induce not from *postulates* and intreated maxims, but from undeniable principles. *Id.*

Whoever shall peruse the physiogmonia of Porta, and strictly observe how vegetable realities are forced into animal representations, may perceive the semblance is but *postulatory*. *Id.*

Calumnies often refuted, are the *postulatums* of scribblers, upon which they proceed as upon first principles. *Addison.*

Some have cast all their learning into the method of mathematicians, under theorems, problems, and *postulates*. *Watts.*

POSTULATE, in mathematics, &c., is such an easy and self-evident supposition as needs no explication or illustration to render it intelligible; as that a right line may be drawn from one point to another.

POSTURE, *n. s.* & *v. a.* }
POS'TURE-MASTER. } Fr. *posture*; Lat. *positura*. State; place; situation; disposition with regard to something else; position of the limbs in respect to each other: to posture, to put in a particular situation: posture-master, one who teaches or practises artificial movements or contortions of the body.

He starts,
Then lays his finger on his temple; strait
Springs out into fast gait; then stops again,
Strikes his breast hard, and then anon he casts
His eyes against the moon, in most strange *postures*.
Shakspeare.

He was raw with *posturing* himself according to the direction of the chirurgeons. *Brook.*

I am at the same point and *posture* I was, when they forced me to leave Whitehall. *King Charles.*

The lord Hopton left Arundel Castle before he had put it into the good *posture* he intended. *Clarendon.*

In this abject *posture* have ye sworn
T' adore the conqueror. *Milton.*

Although these studies are not so pleasing as contemplations physical or mathematical, yet they recompence with the excellency of their use in relation to man, and his noblest *posture* and station in this world, a state of regulated society. *Hale.*

The *posture* of a poetick figure is the description of his heroes in the performance of such or such an action. *Dryden.*

The gill-fins are so *postured* as to move from back to belly and e contra. *Grew.*

When the students have accomplished themselves in this part, they are to be delivered into the hands of a kind of *posturemaster*. *Spectator.*

In the meanest marble statue, one sees the faces, *postures*, airs, and dress of those that lived so many ages before us. *Addison.*

The several *postures* of his devout soul in all conditions of life are displayed with great simplicity. *Atterbury.*

Where there are affections of reverence, there will be *postures* of reverence. *South.*

PO'SY, *n. s.* [contracted from POESY, which see.] A motto on a ring.

A paltry ring,
That she did give me, whose *posy* was,
Like cutler's poetry;
Love me, and leave me not. *Shakspeare.*

You have chosen a very short text to enlarge upon; I should as soon expect to see a critick on the *posy* of a ring, as on the inscription of a medal. *Addison.*

PO'SY, *n. s.* A bunch of flowers. 'Of unknown derivation,' says Dr. Johnson. Mr. Thomson suggests the above word (posy, a motto, i. e. of a ring or nosegay) as its probable etymology.

With store of vermeil roses,
To deck their bridegroom's *posies*. *Spenser.*

We make a difference between suffering thistles to grow among us, and wearing them for *posies*. *Swift.*

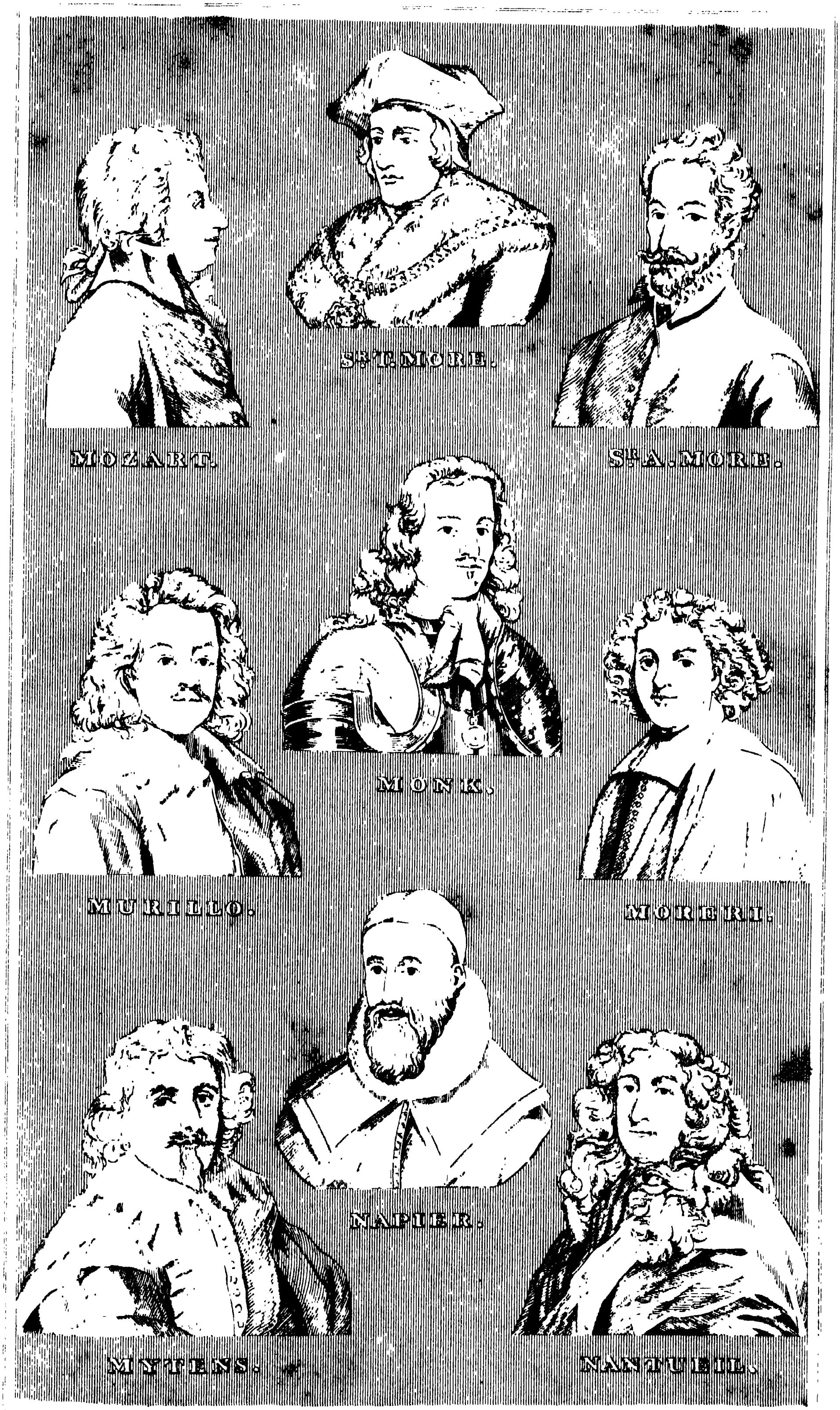
END OF VOL. XVII.

J. Haddon, Printer, Finsbury.

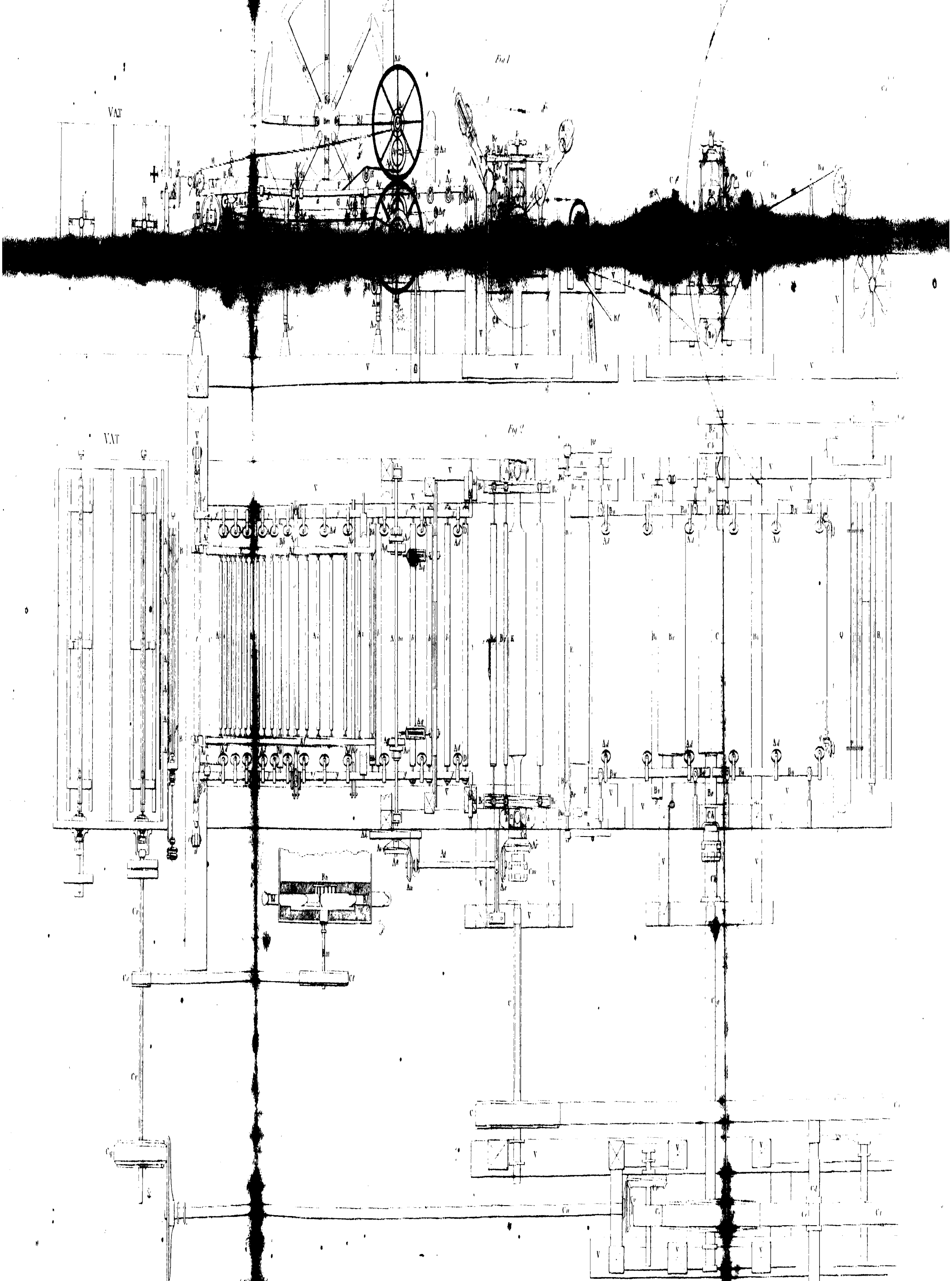

MENANDER.
MICKLE.
METASTASIO.
MERULA.
MERCATOR.
MERCURIALIS.
MEZERAI.
MENGS.
MEURSIUS.


MILTON.
MILTIADES.
S.R H. MYDDLETON.
E. MILLER.
MILNE.
MIRABEAU.


St. L. MOORE.
MONTAIGNE.
MONTESQUIEU.
LADY MONTAGUE.
MONTMORENCI.
MONBODDO.
MONTFAUCON.
MOLIERE.


Sr. T. MORE.
MOZART.
Sr. A. MORE.
MONK.
MURILLO.
MORERI.
NAPIER.
MYTENS.
NANTUEIL.

PAPER MAKING.



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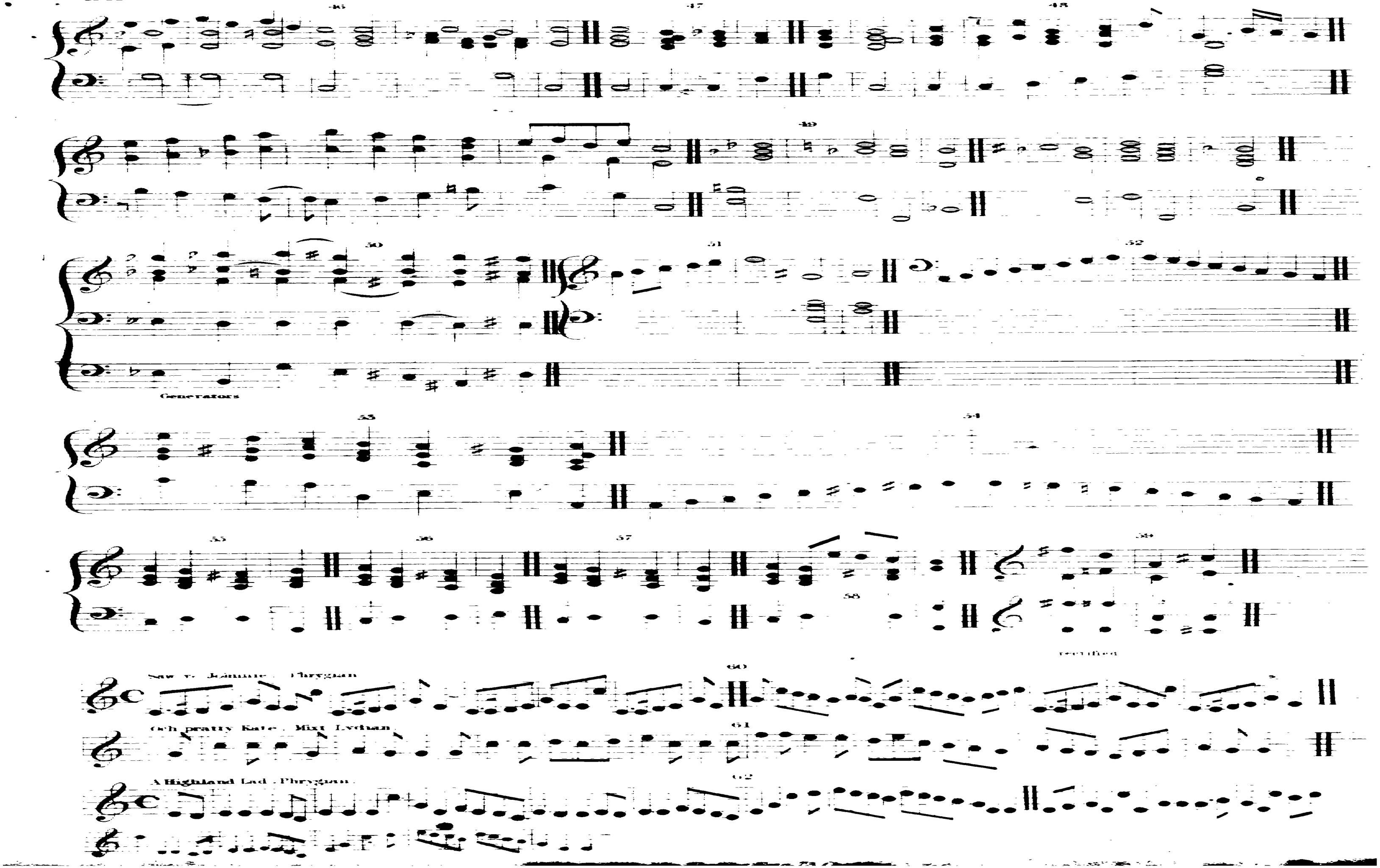
J. Shury sculp

EXAMPLES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Generators
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rectified
Saw ye Johnnie . Phrygian
60
Och pretty Kate . Mixt Lydian
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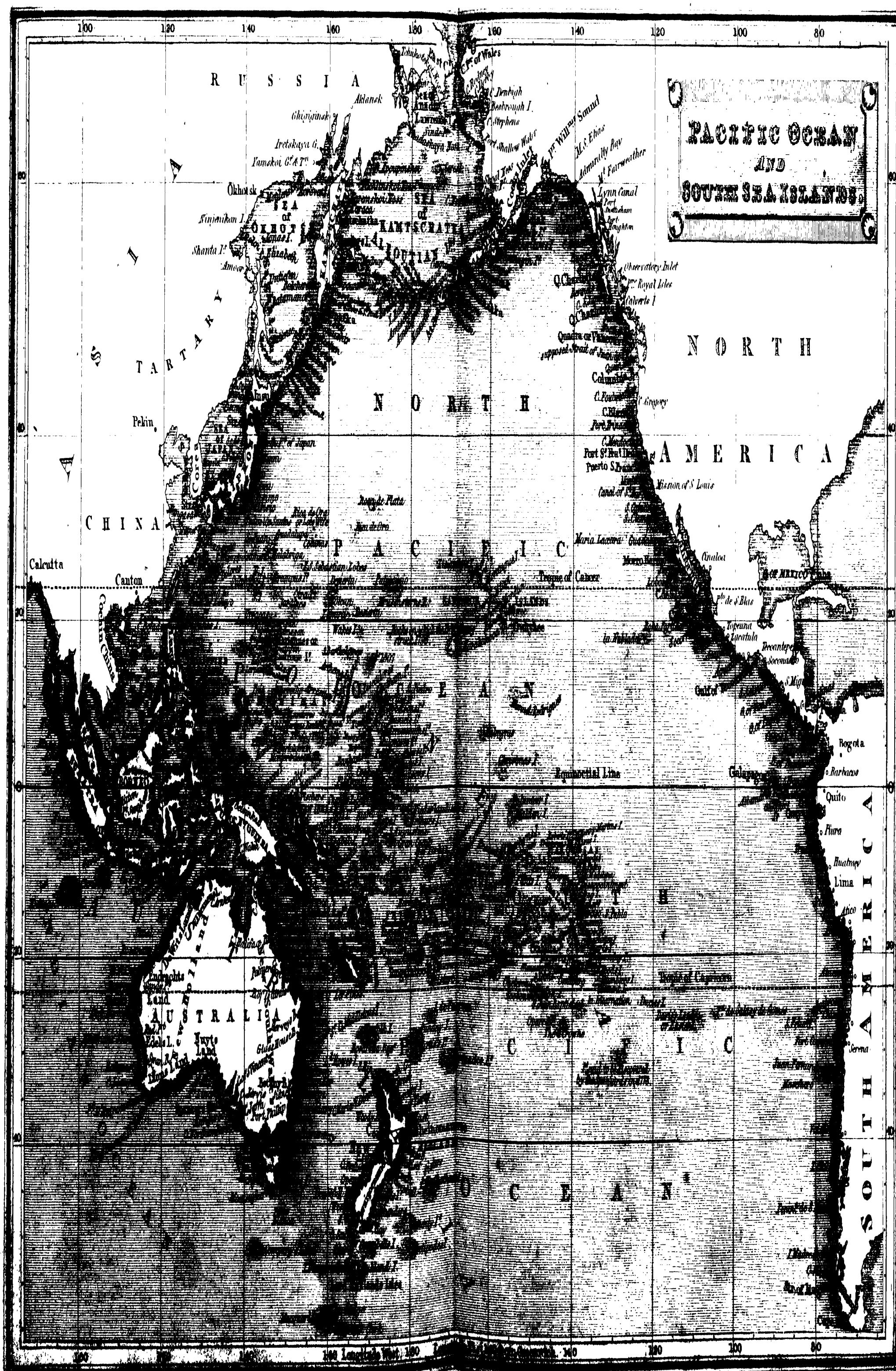
A Highland Lad . Phrygian
62


PACIFIC OCEAN AND SOUTH SEA ISLANDS.
RUSSIA
ASIA
TARTARY
CHINA
Pekin
Canton
Calcutta
Okhotsk
SEA of OKHOTSK
SEA of KAMTSCHATKA
NORTH
PACIFIC
OCEAN
NORTH AMERICA
SOUTH AMERICA
AUSTRALIA
Bogota
Quito
Lima
Equinoctial Line
Tropic of Cancer
Tropic of Capricorn
Mission of S. Louis
Engraved on Steel by J. Shury.

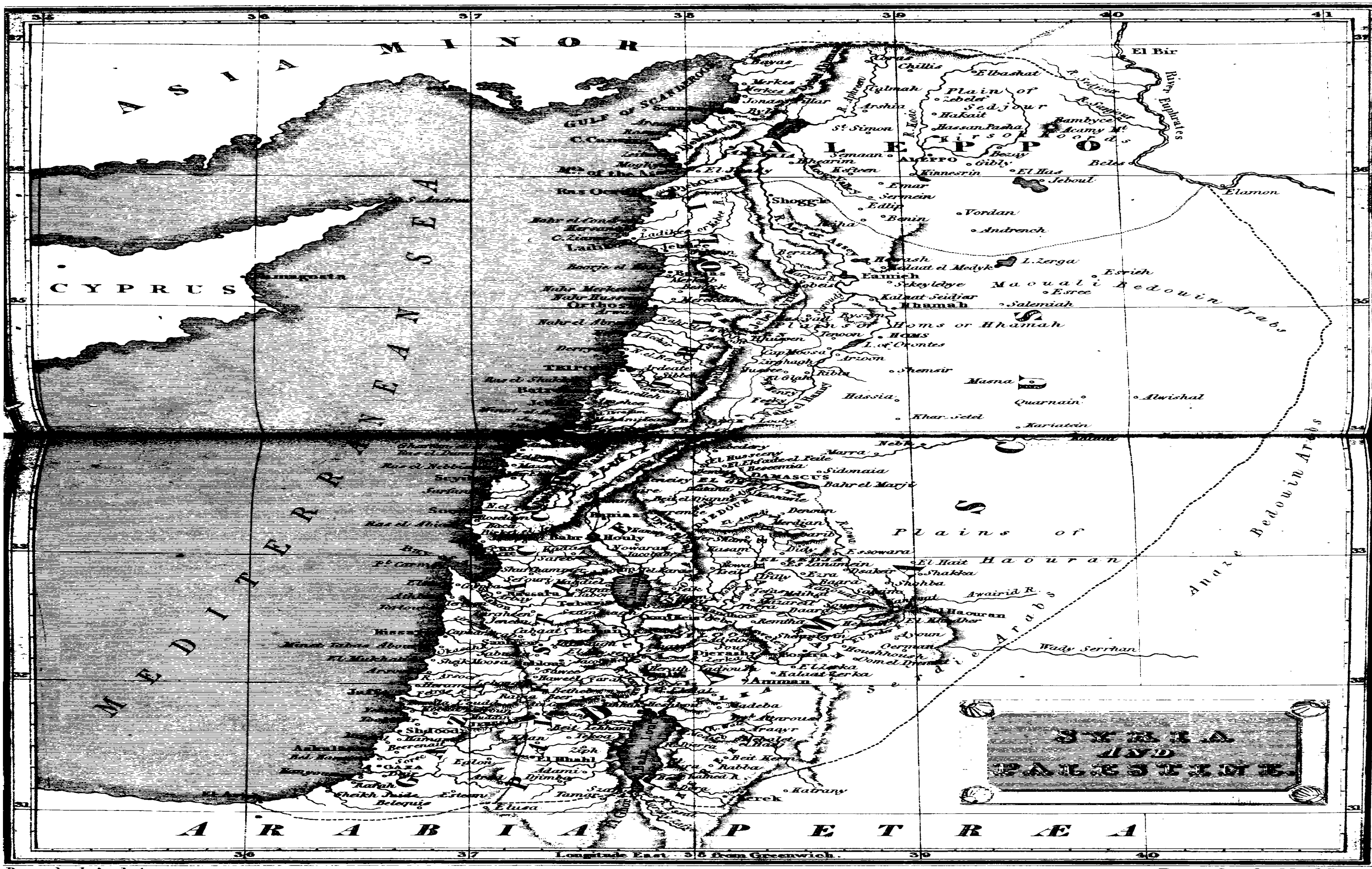


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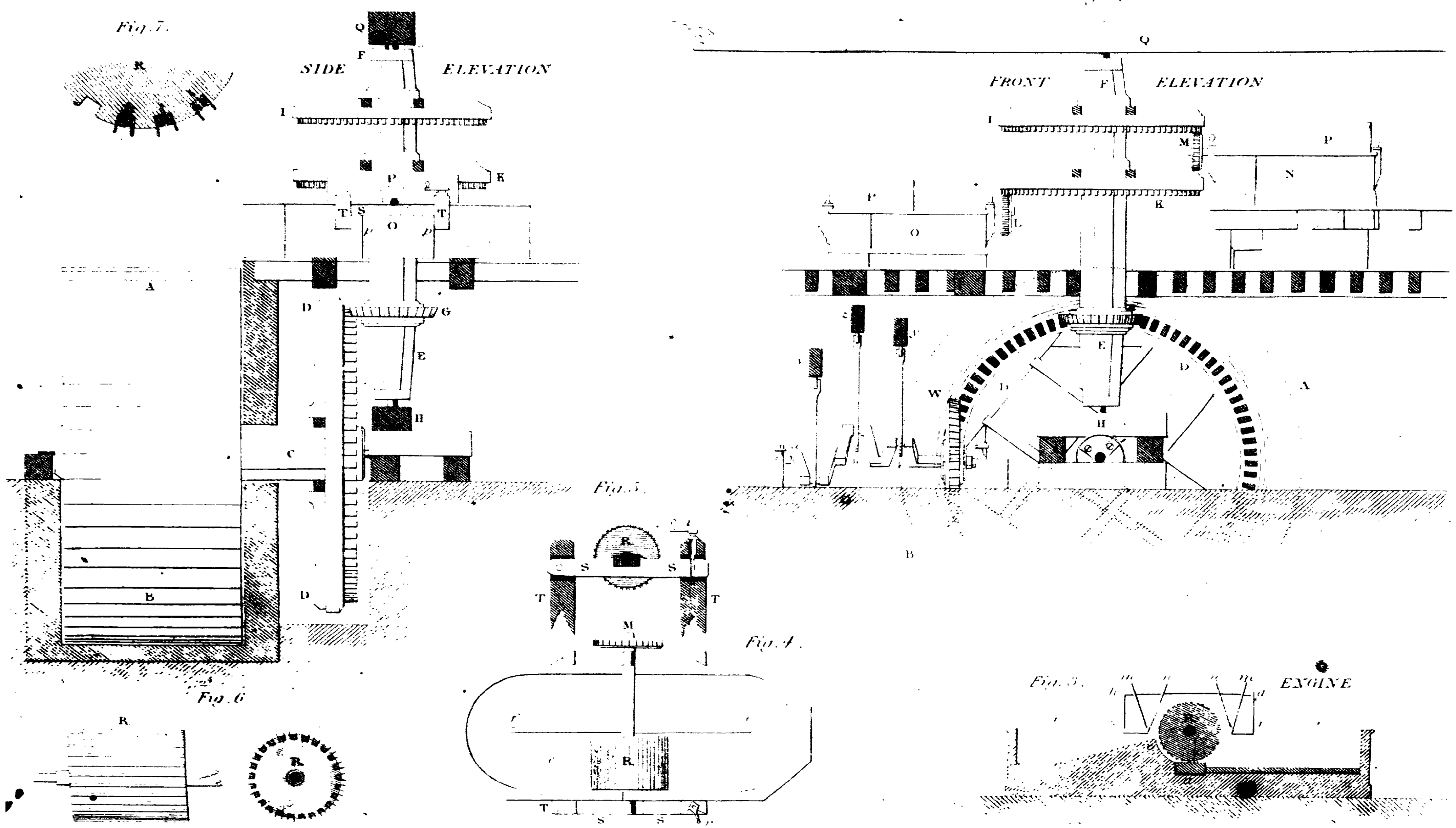
PLATE I.



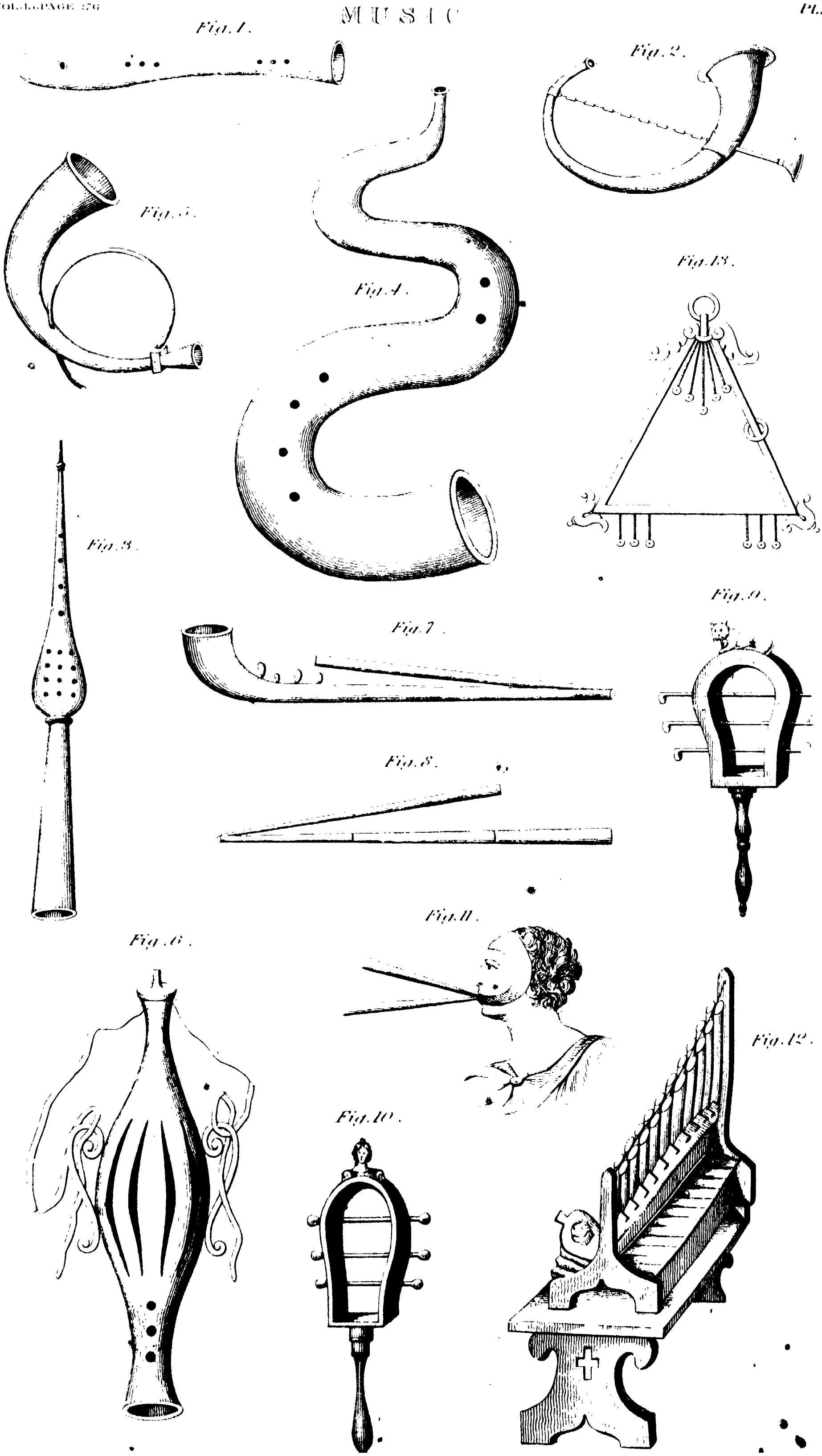
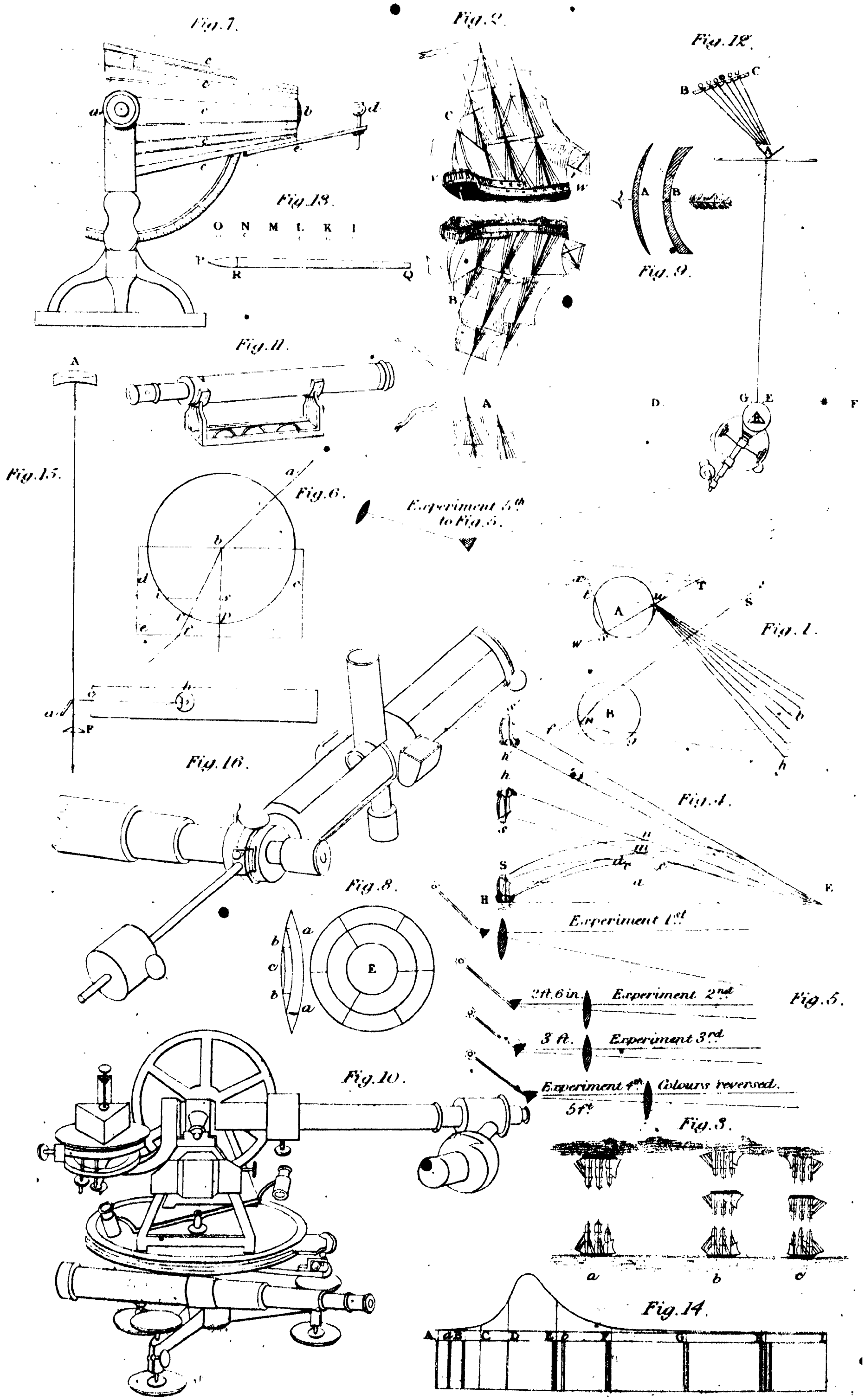


Fig. 1.
Fig. 2.
Fig. 3.
Fig. 4.
Fig. 13.
Fig. 5.
Fig. 7.
Fig. 9.
Fig. 8.
Fig. 11.
Fig. 6.
Fig. 12.
Fig. 10.



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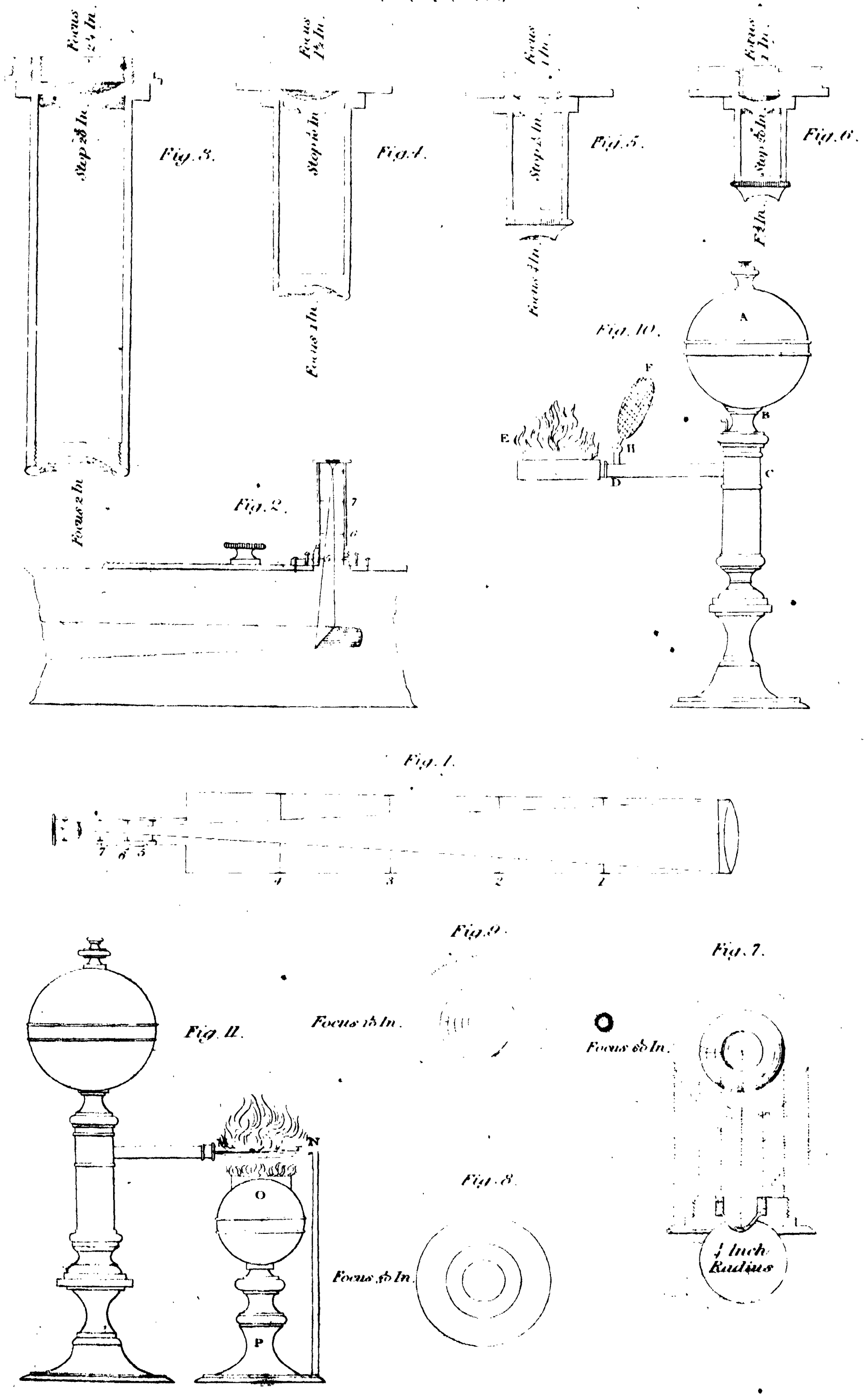
OPTICS.

PLATE



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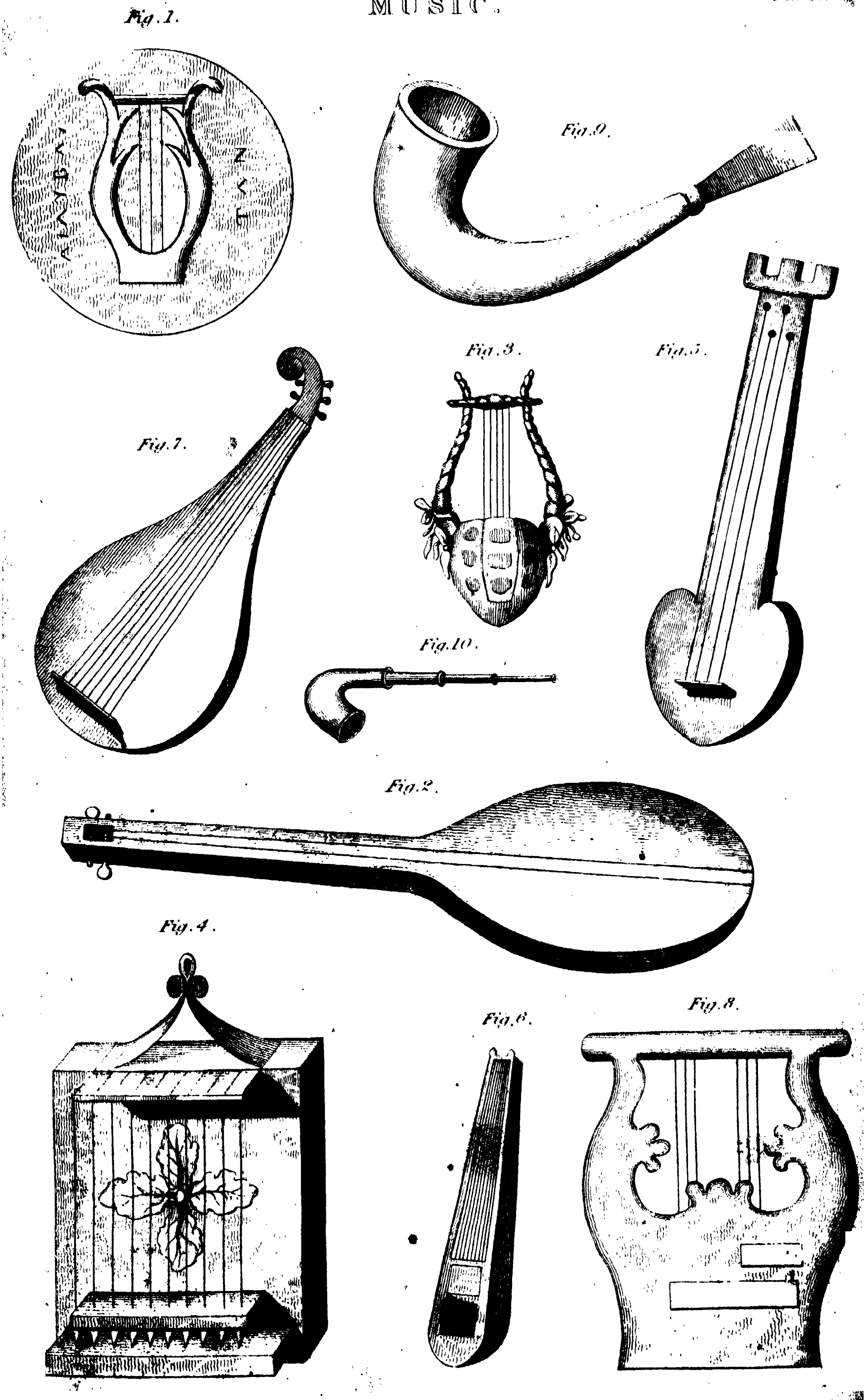

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